BACKGROUND TO THE RESEARCH

1.1 Introduction

Health professionals in chiropractic, osteopathy, physiotherapy and athletic training fields, require high-level knowledge and skills in their assessment and management of patients. This is particularly important when communicating with patients and applying a range of manual procedures, such as physically assessing joints and soft-tissue, performing manipulative and soft-tissue procedures, rehabilitation protocols, and bracing and taping techniques. Prior to embarking on professional practice, it is imperative to acquire optimal situation-specific levels of self-confidence for a beginner practitioner in these areas. In order to purposely foster this professional self-confidence within the higher education context, it is necessary to have valid and reliable scales that can measure and track levels and how they change, used in conjunction with objective measures of competence, and also to determine the factors that impact on developing professional self-confidence.

This dissertation examines the construct of self-confidence and the development of professional self-confidence, and elucidates its importance for students in chiropractic health professional education programs at university. The research has used both quantitative and qualitative approaches and a range of methods. These methods included critically reviewing literature, conceptualizing, generating and validating self-confidence scales, administering questionnaires and conducting interviews with students, and analysing their responses to identify factors that influence the development of professional self-confidence. To gain a greater insight regarding self-confidence and its importance, research in other health professional education programs such as medicine, nursing and dentistry, was reviewed. Also although this study has primarily involved chiropractic students, the findings can pertain to similar health professional programs, such as osteopathy, physiotherapy and athletic training.

The premise for this research stemmed from my experiences working as a chiropractor and certified athletic trainer for 12 years, and thereafter as an academic in chiropractic education. The time leading up to my graduation and my first couple of years as a professional were very challenging. As a student, working in an inner-city clinic with supervising clinicians, I found almost every initial encounter with a patient challenging to my self-confidence. Not to my general self-confidence, but to my confidence in the knowledge and skills vital as a practitioner. Then in practice, for the first year and less in the second year, the loss of the university environment with its inherent guidance and supervision impacted on my self-confidence. Further, since gaining an academic position in a university chiropractic education program, I have heard the issue of self-confidence being raised by many students soon after starting their clinical internship. The challenges they express are similar to my experiences, and therefore I decided to investigate the role of self-confidence in health professional education programs with a view to understanding its impact on learning in clinical settings and to develop strategies which may foster the development of confidence in students.

In this chapter, the first section explores self-confidence and related constructs, in particular, self-concept, self-esteem and self-efficacy. The second section discusses the importance of self-confidence for the student, educator and practitioner when communicating with patients

and applying clinical skills. The third section examines learning opportunities that impact on the development of student self-confidence in health professional education programs. The fourth section outlines factors that impact on self-confidence. The fifth section identifies issues involved in the development of self-confidence scales, and the final section indicates shortcomings of prior research.

1.2 Self-confidence and related constructs

A critical review of literature shows that self-confidence is referred to and utilised in a variety of contexts, from leadership skill sets to athleticism to skill acquisition for trainee health care providers (White, 2009). Self-confidence is a self-construct or individual characteristic that enables a person to have a positive or credible view of themselves, or situations or tasks they encounter (Sieler, 1998). It refers to a person's expectation of his or her ability to achieve a desired goal or outcome in a given locale, and is a highly influential factor in determining an individual's potential (Stevens, 2005). In other words, a person with high self-confidence has an assured view of themselves and their capabilities, their knowledge and skills, which contribute to making them persist in an endeavour and help others form an impression of a credible professional.

Self-confidence is a self-evaluation. According to Koriat, Lichtenstein and Fischoff (1980), an evaluation of self-confidence occurs in two steps. First, an individual assesses his or her knowledge and skills regarding a particular situation or task. Second, based on the outcome of this assessment, the situation or task is reviewed and a belief-level is chosen, indicating how successful the individual feels he or she will be. Bandura (1986) also acknowledges in relation to self-confidence the importance of self-reflection and self-regulating mechanisms, such as knowing when to ask for help.

In an education context, both high and low achievement students are typically informed and guided by their beliefs and perceptions rather than by reality (Pajares, 2002); in other words, by their level of self-confidence about what they believe they are capable of. This pertains more to new endeavours as opposed to experiences previously encountered. For example, Koriat, Lichtenstein, and Fischoff (1980) argue two primary reasons for self-confidence. First, one assesses his or her knowledge and skill of a situation or task, which includes previous experience. Second, based on that evidence, the situation is reviewed and a belief-level is chosen about how successful one feels he will be. In health professional education programs, educators, supervisors and mentors need to be aware of this construct and tendency, and purposely promote student self-confidence in order to avert or reverse a negative mindset. Additionally, they need to be able to measure levels of self-confidence and improve low levels and, in comparison with objective measures of competence, address issues of misplaced over-confidence. Bandura's (1977) social learning theory posits motivation, reinforcement and past experience as key components that promote self-confidence. Promoting self-confidence early in clinical training provides a crucial foundation for the successful acquisition and implementation of vital knowledge and skills (Lundberg, 2008). Several authors note the more clinical successes a student experiences the more self-confidence is reinforced (Chesser-Smyth, 2005; Clark, Owen, & Tholcken, 2004; Bandura, 1986; Moreno et al., 2007; Savitsky et al., 1998)

Self-confidence is perceived as one of several interrelated self-constructs which include self-concept, self-esteem and self-efficacy. While these constructs have similarities, each is considered to be a distinctive internal psychological process of the individual. Various authors differentiate self-confidence from self-concept and self-esteem by referring to the two latter constructs as personality traits with higher temporal stability or robustness across a wide range of contexts (Kroner & Biermann, 2007; Savitsky, Medvec, Charlton & Gilovich, 1998; Story, 2004; Wise, 2007). In contrast, self-confidence is highly contextual and task-specific (Kumar & Jagacinski, 2006; Moreno, Castillo & Masere, 2007; Savitsky et al., 1998), and is often used interchangeably with self-efficacy (Bandura, 1986; Wise, 2007). In order to better understand what epitomises self-confidence, these additional constructs are reviewed below.

Self-concept

Self-concept is considered to be fundamental in the personal and social development of an individual. In addition, educational research has established an association between self-concept and academic achievement (Delugach, Bracken, Bracken & Shicke, 1992; Marsh, 1990a; Valentine, DuBois & Cooper, 2004), and other educational issues, including coursework selection (Marsh & Yeung, 1997), educational and occupational aspirations (Marsh, 1991), academic motivation (McInerney, Roche, McInerney & Marsh, 1997), and bullying (Marsh, Parada, Craven & Finger, 2004; Marsh, Parada, Yeung & Healey, 2001). Therefore, in education contexts, valuing and enhancing self-concept is an important goal.

An analysis of literature shows that, prior to 1976, self-concept was broadly assumed to be unidimensional in structure, and quite consistent across different contexts (Bracken, 1996; Hattie, 1992). Most self-concept evaluation measures and interventions were grounded on a global, all-encompassing perspective. As such, the term 'self-concept' was commonplace, and further theory development and accurate measurement to augment the construct was considered superfluous (Marsh & Craven, 1997). However, in 1976, the structure and measurement of self-concept became a central research issue, due to the development of a multidimensional model of self-concept (see Shavelson, Hubner & Stanton, 1976). This research included a comprehensive review of unidimensional research, and identified crucial shortfalls. In particular, it noted that there were no instruments that clearly supported the separation of self-concept into distinct domains. Therefore, these researchers argued for a construct validity approach to the measurement of self-concept and developed a detailed hierarchical model of this. Overall, they suggested that self-concept is multifaceted, hierarchically arranged, increasingly context-specific, and more differentiated with age.

Subsequent research has vindicated their work and supported the multidimensional structure of self-concept (Byrne & Shavelson, 1996; Hattie, 1992; Marsh, 1990a, 1993), with some refinements (see Marsh & Shavelson, 1985). This multidimensional structure provided a blueprint for a new generation of multidimensional self-concept instruments, and ensuing developments in theory, methodology and measurement have allowed considerable advances in the quality of self-concept research (see Byrne, 1984, 1996; Marsh & Hattie, 1996). Therefore, the development of stronger multidimensional instruments has further verified and defined the multidimensional structure of self-concept. This emphasises the interdependence of theory development, measurement and practice (Marsh, 1990a).

Self-esteem

Self-esteem is commonly perceived as an important part of self-concept (Baumeister, 1993; Cast & Burke, 2002; Mruk, 1995; Wells & Marwell, 1976; Wylie, 1979), and is often used synonymously with self-concept in literature on the self (Rosenberg, 1976). In general, self-esteem refers to an individual's overall evaluation of the self (Gecas, 1982; Rosenberg 1990; Rosenberg, Schooler, Schoenbach & Rosenberg, 1995). One of the most extensively used instruments to assess self-esteem is the Rosenberg Self-Esteem Scale (Blascovich & Tomaka, 1991). According to Rosenberg (1965), a person's self-esteem comprises an array of thoughts and feelings about his/her own worth and importance, which shape a global positive or negative attitude about the self.

Furthermore, self-esteem is viewed as having two distinct dimensions, *competence* and *worth* (Gecas, 1982; Gecas & Schwalbe, 1983). The competence dimension (or efficacy-based self-esteem) refers to the degree a person thinks that they are capable and efficacious. The worth dimension (or worth-based self-esteem) refers to the degree a person feels that they are valuable. This focus on the nature of self-esteem is vital, due to the association of high self-esteem with various positive outcomes for the individual, local community and society as a whole (Baumeister, 1993; Smelser, 1989). In particular, it is widely believed that strengthening the self-esteem of a child or adolescent can be extensively beneficial, on personal and collective (the value and individual places on their social groups), levels.

Self-efficacy

Self-efficacy and self-confidence are often associated and the terms used interchangeably in research, and it can be difficult to differentiate these constructs due to overlapping features. Overall, self-efficacy refers to an individual's belief in their ability to perform a specific behaviour or skill (Bandura, 1997). In other words, "self-efficacy involves a personal judgement of one's capabilities to organise and execute courses of action, which are required to attain designated types of performance" (Bandura, 1986). According to social cognitive theory, the greater an individual's perceived self-efficacy and the more rewarding the expected outcome, the more likely the person is to successfully perform a specific behaviour or skill (Bandura, 1997).

Four primary sources inform and shape self-efficacy: *vicarious experience*, *verbal or social persuasion*, *physiological states* and *enactive mastery experience* (Bandura, 1977). *Vicarious experience* involves a person watching others (or models) and noting the consequences of behaviour. *Verbal or social persuasion* involves others persuading a person that he/she has the capabilities to master and execute given activities. *Physiological states* involves anxiety, stress, arousal, fatigue and mood providing a person with information about his/her beliefs. *Enactive mastery experience* involves a person gauging and interpreting the effects of his/her actions, which subsequently influence their beliefs. This is the most influential source of self-efficacy, whereby successes raise self-efficacy and failures lower self-efficacy. Each of these sources is relevant to health professional education.

The interrelationship between the constructs

Both self-esteem and self-efficacy are key constructs that help explain individual differences in motivation, attitudes, learning and task performance (Chen, Gully & Eden, 2004). These self-constructs strongly affect how people act and react in various settings as suggested in the theory of core self-evaluations (Judge, Locke & Durham, 1997), where they are combined into a single core self-evaluation construct (Judge, Locke, Durham & Kluger, 1998; Judge,

Thoreson, Pucik & Welbourne, 1999). However, an important difference is that self-esteem captures a more affective evaluation of the self and self-efficacy captures a more motivational belief regarding task capabilities (Betz & Klein, 1996; Brockner, 1988; Chen, Gully & Eden, 2001; Gardner & Pierce, 1998). In other words, self-esteem and self-efficacy differ according to their relative emphasis on affective versus motivational components (Chen et al., 2004), whereby self-esteem is more strongly associated with anxiety affective processes and self-efficacy is more strongly associated with achievement motivational processes (Kanfer & Heggestad, 1997).

In contrast, self-confidence essentially refers to belief in personal worth and the likelihood of succeeding, and is a combination of self-esteem and self-efficacy (Neill, 2005). According to Neill (2005), self-esteem consists of a general feeling of self-worth or self-value. A person with low self-esteem believes that he/she is worthless or inadequate, while a person with high self-esteem believes that he/she is valuable and capable. In turn, according to Pajares (2002), self-efficacy is the belief or confidence a person has in their ability to perform activities or skills that they attempt. Self-efficacy can be general or specific, whereby general self-efficacy refers to the belief in a general capacity to perform tasks and specific self-efficacy refers to the belief in a capacity to perform specific tasks (Neill, 2005). Bandura (1997) distinguishes between self-confidence and self-efficacy by depicting confidence as an elusive term that refers to strength of belief but does not necessarily specify the substance. However, Sanders and Sanders (2005) posit self-efficacy as the parent concept of academic self-confidence. As such, self-confidence can be perceived as stemming from the same sources as self-efficacy, and academic self-confidence can be viewed as self-efficacy. Self-efficacy is also sometimes used to refer to situation-specific self-confidence.

Whilst self-efficacy is a judgment of task capabilities, self-concept is a person's description of their perceived self, accompanied by an evaluation of their self-worth (Pajares & Schunk, 2001). To illustrate this, self-efficacy beliefs reflect questions of "can" (can I write well?), and self-concept descriptions reflect questions of "being" and "feeling" (how do I feel about myself as a doctor?). The answers to such self-efficacy questions reveal whether the person possesses high or low self-confidence when presented with performing the task or activity (Pajaries & Schunk, 2001), and such beliefs help determine the outcomes the person expects. In other words, those with high self-confidence anticipate successful outcomes, and those with low self-confidence anticipate detrimental outcomes. For example, students confident in their social skills anticipate successful social encounters, while students doubting their social skills often envision rejection or ridicule even before they establish social contact. Students confident in their academic skills expect high marks for assignments and exams and expect the quality of their work to reap personal and professional benefits, while the opposite is true for students lacking confidence who envision a low grade before they submit an assignment or begin an exam, or even enrol in a course (Pajares, 2002).

As such, the role of self-confidence in learning and in professional practice is substantial, and from an educational perspective it is vital to be able to measure levels of students' self-confidence and also to determine the factors that increase and decrease these levels, in order to foster and effect positive change. The following section elaborates on the importance and role of self-confidence in patient communication and clinical skills.

1.3 Self-confidence in patient communication and clinical skills

For health care professionals, the ability to effectively communicate with patients and apply a range of clinical and manual skills is imperative, and optimal self-confidence is essential. In other words, their self-confidence is neither too high, nor too low, and is congruent with levels of competence.

For effective communication to occur, the practitioner needs to establish a relationship with their patients by building rapport, actively listening and responding to their verbal and non-verbal cues, and tailor information to meet their individual needs (Halkett, McKay & Shaw, 2011). The practitioner-patient relationship has many aspects, and the quality of communication has a significant impact on patient satisfaction (Wiggers, Donovan, Redman & Sanson-Fisher, 1990), and medical outcomes (Greenfield, Kaplan & Ware, 1990; Stewart, 1995). For example, the capacity of a practitioner to communicate with and relate to his/her patients facilitates the early detection of emotional problems, reducing anxiety levels and preventing possible psychological complications, which increases patient satisfaction (Parle, Maguire & Heaven, 1997; Silverman, Kurtz & Draper, 2005).

Given the value of effective communication, many health professional education programs and national organisations, such as the Association of American Medical Colleges, support an increased emphasis on communication skills and now objectively evaluate this as a core competency. However, communication skills and especially patient communication are complex in nature and personal and curricular factors will influence how health professional students master these skills (Noble, 2002). The development of general communication skills, and the impact of self-confidence on this, is difficult to establish considering that these are developed early in life and appear to be an integral part of cognition (Lakoff & Johnson, 1999). As such, there are a multitude of factors that will influence this process. In contrast, theoretical knowledge about communication skills occurs later and can be enhanced through formal education. Whilst the increase in knowledge that transpires during a university degree is alone insufficient for actual behaviour change (Hulsman, Ros, Winnubst & Bensing, 2002), the theoretical knowledge may help the student achieve their training goals (Baerheim et al., 2007) and especially extend their patient communication skills.

Whilst possessing optimal levels of self-confidence in clinical skills may be ideal (Gardner, Pinsky & Schaad, 2002; Lynch, Parsons and Gardner, 2005), the extent to which self-confidence reflects actual competence in clinical skills is contentious. Some research has revealed a lack of direct relationship between self-confidence and competence (Morgan and Cleave-Hogg, 2002; Wayne et al., 2006), leading some to conclude that self-confidence may not be a reliable indicator of actual competence (Stewart et al., 2000, Eva and Regehr, 2005). Other research has also shown that most students tend to overestimate their performance and ability, with the worst offenders in the lowest quartile of performance (Kruger & Dunning, 1999). However, possessing optimal levels of self-confidence in skills is important because it is a self-evaluation of competence and capability to effectively manage various situations. As such, this provides motivation, which is a key determinant of persistence in difficult learning activities (Klein, 2006; Shrauger & Schohn, 1995). In part, this link between optimal levels of self-confidence and increased motivation to practice and apply learnt skills (Mann & Eland, 2005), has contributed to the view that self-confidence is a central component in effective clinical performance (Mavis, 2001). In addition, having high self-confidence is a powerful reinforcement for any activity (Wechsler, Levine, Idelson, Rohman & Taylor, 1983), and is

closely associated with the development of skills, which successively increases confidence and enhances performance (Pommerenke & Weed, 1991).

Overall, these perspectives regarding the correlation between self-confidence and competence primarily affirm the importance of measuring this relationship, especially to identify students whose reported self-confidence does not match their actual competence (under-confident or over-confident students). In particular, it is important to identify students with sub-optimal levels of self-confidence, so that educators can implement alternative learning opportunities to motivate and help students improve deficient skills. Self-confidence, whether low or high, is perceived as crucial in the performance of tasks, such as communicating with patients and applying clinical skills. Accordingly, this research has developed scales to measure the professional self-confidence of students within health professional education programs, and to identify factors that may influence its development. The following section discusses the tertiary learning opportunities that may influence professional self-confidence.

1.4 Learning opportunities and the development of self-confidence

As discussed in the previous section, the motivation, devotion and persistence of students in the learning process is influenced by their level of self-confidence. For example, if a student believes that they can successfully perform a task, then they will attempt the task (Lundberg, 2008). However, if a student believes that their effort will be in vain, then they will exhibit frustration and a decreased effort (Klein, 2006). Within the educational context, students are also exposed to various learning opportunities, which range from theoretical instruction to real-world experience facilitated by a mentor, and it is crucial to know which learning opportunities and which specific parts impact on self-confidence. Overall, this knowledge would enable researchers and educators to develop and implement alternative strategies and methods to help boost self-confidence.

In health professional education programs, the occurrence of learning opportunities can be mixed and may vary each year. For example, some programs include problem-based learning and early patient contact (doctor-patient course) in the first few years. Others programs have an integrated curriculum with parallel preclinical and clinical training, and some use a traditional model with a sharp division of two years or more between preclinical and clinical training. Learning opportunities that apply the following educational methods and strategies may be beneficial in the development of professional self-confidence, for example: role playing, journaling, problem-based learning, live or web-based learning, e-learning, virtual learning, practical laboratories, skill reviews, reusable learning objects and clinical performance-based examinations, such the Objective Structured Clinical Examination. However, further research is needed to investigate this view, using rigorous instruments and methodology.

In addition, guided practice learning opportunities, which aim to expose students to clinical situations or environments, have been demonstrated to be effective in the development of self-confidence in patient communication and clinical skills. Guided practice can assume various forms, and have differing aims and outcomes. For example, short, intensive, practical guided opportunities that have specific objectives and often emphasise a part of clinical practice, such as a surgical technique or examination method. In turn, long preceptorships or internships where the student is placed in a clinical environment and exposed to clinical

practice, works exclusively with real patients and is supervised by a practitioner. Whilst these two forms of guided practice clearly differ, there is some evidence that they influence professional self-confidence. For example, the feedback from the supervising practitioner impacts on clinical performance, which is affected by self-confidence (Veloski, Boex, Grasberger, Evans & Wolfson, 2006). However, the influences of these learning opportunities warrant further consideration and investigation.

Overall, health professional education programs demand that students move from theoretical learning to real-life situations quickly and successfully. This transition can be effected by the self-confidence of the student, and knowing which learning opportunities foster and enhance self-confidence is vital. This can be accomplished through quantitative and qualitative research, whereby valid and reliable instruments are developed to measure professional self-confidence, and key influential factors are identified through personal accounts.

1.5 Factors that impact self-confidence

In addition to learning opportunities, many other factors may impact on the development of self-confidence and need to be considered. Given that a part of self-confidence is a person's perception of their competence and skill, and their capability to effectively manage various situations, intrinsic factors, such as gender and age, and external factors, such as previous life experiences, may influence the development and display of professional self-confidence. Some research with medical students examined gender differences, whereby females reported less self-confidence in their abilities (Minter, Gruppen, Napolitano & Gauger**,** 2005; Rees, 2003; Rees & Shepherd, 2005) appeared to be less confident (Blanch, Hall, Roter & Frankel, 2008), and reported higher levels of anxiety and stress than males (Dahlin & Runeson, 2007; Moffat, McConnachie, Ross & Morrison, 2004). Also, age and experience are often associated with mature-aged students, and their levels of self-confidence may be higher for transferable skills, such as communicating, but lower for profession-specific skills, especially if these have been recently introduced.

Therefore, in order to foster and enhance professional self-confidence in health professional education programs, it is imperative for researchers and educators to understand the links between non-educational factors and educational opportunities, in order to develop pertinent and effective teaching and learning methods. A key ingredient in doing this is the development of valid and reliable scales that can measure professional self-confidence, and used in conjunction with qualitative methods, in order to identify factors which help or hinder it, as this research did. The following section addresses aspects of the development of scales to measure student self-confidence in patient communication and clinical skills.

1.6 Development of scales to measure professional self-confidence

Whilst a multitude of learning experiences may influence self-confidence, the most critical and influential learning context in health education is the clinical internship (Hecimovich & Volet, 2009). In order to foster high levels of student self-confidence prior to embarking on professional practice, health care educators must purposely address this issue during the clinical internship. This requires the use of valid and reliable scales, which track changes in levels of self-confidence during this critical period, either independently or in relation to

actual competence. The scales presented in this research aim to contribute to the scientific body of knowledge on scale development in manual medicine.

A variety of health education research has examined the outcomes of measuring student self-confidence during clinical internships. A review of this research suggests that there are three aspects to consider in the development and evaluation of self-confidence scales for students in health professional programs: the degree of specificity, the rigour of measurement and the type of psychometric analysis.

The first aspect involves deciding the degree of specificity to adopt. In other words, whether to measure overall levels of professional self-confidence or to measure levels of student self-confidence for specific skills or sub-components, such as patient communication and clinical skills. For example, Goldenberg, Iwasiw and MacMaster (1997) developed a self-efficacy scale that measured levels of self-confidence for various tasks during a clinical preceptorship. One item inquired about the level of confidence in performing general psychomotor skills, without emphasising specific components of the skills. Whilst this is an acceptable way to measure overall self-confidence in clinical skills, it does not enable an in-depth analysis of levels of self-confidence in performing specific psychomotor skills, such as heart and lung auscultation. Subsequent empirical research addressed this aspect, and measured levels of self-confidence for specific clinical skills, such as obtaining blood pressure (Lai, Sivalingam & Ramesh, 2007), and performing eye examinations (Esterl, Henzi & Cohn, 2006). As such, this provided empirical evidence that it was possible to document changes in levels of self-confidence for a specific psychomotor skill. This was important for the development of the scales in this research, which aimed to measure levels of student self-confidence for various specific skills commonly used in manual medicine, such as joint mobilisation/manipulation, rehabilitation techniques and physical examination procedures. Within this field, measuring specific skills is vital because assessing only overall confidence will not provide enough evidence about the components that students may be struggling with, thus preventing the opportunity to further address and enhance professional self-confidence.

The second aspect involves the rigour of measurement. This analysis is vital when developing instruments to measure key determinants of human functioning (Bandura, 2006), such as self-confidence. Within health education, there is a lack of information about the instruments used to gauge professional self-confidence, and most studies do not describe the development and psychometric analysis of applied scales, although there are exceptions (Ferrini & Klein, 2000; Mason & Ellershaw, 2004; Ringsted, Pallisgaard, Ostergaard & Scherpbier, 2004). These studies included a detailed description of scale development, and contributed a better analysis and understanding of the influence of clinical internships on self-confidence in clinical skills. However, the lack of information in most studies may be due to a prevailing focus on levels of self-confidence and changes, rather than the quality of the actual instruments. Regardless, this makes it difficult to assess whether the scales are valid and reliable, and consequently to trust reported impacts of clinical internships on professional self-confidence.

The third aspect involves the type of psychometric analysis adopted for the development of appropriate instruments. The purpose of psychometric analysis is to establish whether a quantitative conceptualisation has been operationalised successfully; in other words, whether the items selected to represent a construct, such as self-confidence, form valid and reliable measures of this construct. In this research, the Rasch measurement model was selected to examine the quality of the instruments, rather than traditional test theory, due to the

fundamental properties of the measures that the Rasch model produces, and the availability of Rasch Unidimensional Measurement Model (RUMM2020) software for interactive analysis of responses (Andrich, Sheridan and Luo, 2001).

1.7 Shortcomings of prior research

This research focuses on the educational experiences that emphasise and guide the practical learning of health professional students, such as short, intensive, practical courses that have very specific objectives and long preceptorships or internships that are more encompassing. Such guided practice into the profession is identified as a valuable educational experience, and impacts on professional self-confidence. However, a critical review of research on short, intensive, practical courses (Ault, Sullivan, Chalabian & Skinner, 2002; Esterl et al., 2006; Ferrini & Klein, 2000; Peyre, Peyre, Sullivan & Towfigh, 2006; Robb, Falk, Khan & Hill, 2009; Stewart et al., 2007), and long preceptorships or internships (Goldenberg et al., 1997; Haist, Wilson, Fosson & Brigham, 1997; Henning, Weidner & Jones, 2006; Lai et al., 2007; Lyon, McLean, Hyde & Hendry, 2008; Smith, Lennon, Brook, Ritucci & Robinson, 2006) highlights the need for further research. Stronger assessment and more evidence is required to determine their effectiveness and long-term impact, including the use of valid and reliable scales, the inclusion of control groups, if possible, and actual measures of competence, and follow-up measurement.

Within health education literature, there is empirical and anecdotal evidence that student professional confidence is enhanced through a preceptorship experience (Harrell, Kearl, Reed, Grigsby & Caudill, 1993; Lai & Ramsesh, 2006; Levy & Merchant, 2005; Morgan & Cleave-Hogg, 2002; Wimmers, Schmidt & Splinter, 2006; Lai et al., 2007; Lyon et al., 2008; Smith et al., 2006). Most of this research was conducted in medicine and nursing, some in physical therapy, dentistry and athletic training, and little research in chiropractic education. Studies have investigated the effect of a preceptorship experience on levels of professional self-confidence for both preceptors and students (Goldenberg et al., 1997), the relationship between amount of hands-on or active care practice and levels of professional confidence (Lai et al., 2007), the importance of exposing students to various preceptorship environments for the development of their professional self-confidence (Lyon et al., 2008; Smith et al., 2006), and the impact of peer-assisted mentoring on levels of professional self-confidence (Haist et al., 1997; Henning et al., 2006).

Whilst guided practice is a well-established learning experience in health education and there is some evidence that it facilitates the development of professional self-confidence, it is not always measured reliably and more rigorous research is required to evaluate its effectiveness. As outlined, the inclusion of control groups in research designs and follow-up measurements are necessary to strengthen evidence of effectiveness. The absence of an experimental design in many studies makes it difficult to claim that the professional self-confidence gained by students in these learning experiences was more effective than other learning experiences or none at all. In addition, the use of both quantitative and qualitative evaluations would provide a greater understanding of the influence of these learning experiences, and reveal whether some components have a more negative impact and others a more positive impact on levels of professional self-confidence for students.

In addition, the availability of psychometrically robust instruments to gauge and review the professional self-confidence of students in health professional education programs, is sorely limited. The value of developing valid and reliable measures of self-confidence in patient communication and clinical skills is two-fold: to track changes in levels of self-confidence in specific skills over time, and to examine the degree of congruence between confidence and competence. Importantly, it also enables the identification of students who may be over-confident or under-confident. For example, within the chiropractic profession, all clinical encounters involve patient communication and clinical skills, and having sufficient levels of professional self-confidence is paramount for practitioners and most importantly for patients. However, there is limited research in chiropractic education on professional self-confidence among chiropractic students and on the effect of guided practice into the profession. For example, within chiropractic education, there are some methods and opportunities that may facilitate professional self-confidence, but there has not been enough research to verify their effectiveness, and only a few studies indirectly identified self-confidence as a component (Ebbets, 2002; Spegman & Herrin, 2007).

Moreover, health professional education fields, from athletic training to physiotherapy, share similarities regarding patient communication and clinical skills. However, the fields and their programs all differ, especially during the clinical stages of education. Therefore, the availability of robust measures of professional self-confidence is essential across all health professional education fields and programs. This research addresses a few gaps in prior research by developing two new scales to gauge the situation-specific self-confidence of chiropractic students, and which can be applied in other health education programs, such as osteopathy, physiotherapy and athletic training. The Rasch measurement model was used for the psychometric analysis of these scales and to provide measures of levels of professional self-confidence. These scales were also used to identify factors that appeared to have caused increases or decreases in confidence this during clinical internship. This research provides a novel contribution to the chiropractic education field. The following chapter explicates the aims and methodological phases in this research.

2. EMPIRICAL STUDY

2.1 Aims

The multifaceted nature of self-confidence and its importance for students in health professional education programs supports the need for continuing research. Within the higher education context, knowing the specific opportunities and factors that increase or decrease the professional self-confidence of students can assist educators in curricula development.

In order to establish the base-levels of self-confidence and monitor changes across time, it is necessary to have valid and reliable instruments that can measure it, used in conjunction with objective measures of competence to identify under-confident or over-confident students. The benefits of monitoring and understanding self-confidence reach beyond the students and the classroom, and also crucially impact on patients. Accordingly, this research aims to examine the development of professional self-confidence in chiropractic students, and to produce an instrument to measure levels of confidence in patient communication and clinical skills. This research consisted of five linked phases, which are described in the section of methodology and which were conducted in order to address the following aims:

Aims:

1. To examine the extent to which professional self-confidence has been addressed in health education research, the position of self-confidence in educational psychology research, and how it is fostered in chiropractic education, through a critical review of literature.
2. To examine previous research on the impact of guided clinical practice on the professional self-confidence of health care students through a critical review of literature.
3. To determine the key aspects that influence self-confidence by conducting in-depth interviews about self-confidence.
4. To develop a confidence questionnaire with two new scales measuring situation-specific self-confidence for chiropractic students during their clinical internship and to establish the psychometric properties of these scales.
5. To investigate the impact of various factors on level of self-confidence, including the effects of gender and age, experience in the profession, and entry qualifications.
6. To identify key factors during the clinical internship that appears to have increased or decreased professional self-confidence in patient communication and clinical skills.

The following section provides an overview of the methodology by outlining the five phases of this research project. This is followed by an overview of the four research articles which includes how each addressed a specific aim or aims of this research.

2.2 Methodology

The initiative to investigate levels of professional self-confidence and causative or mediating factors in its development occurred after casual conversations with chiropractic students who identified the clinical internship as significantly challenging their self-confidence. The initial

aim was to gain insight concerning the construct of self-confidence, and its importance and impact on students during their health care education. The research eventually involved the development of a questionnaire and scales measuring self-confidence. The empirical data gleaned from this was then combined with qualitative data gathered from student interviews to identify and explicate the factors that influence professional self-confidence. The research consisted of five methodological phases which addressed the research aims (see Figure 1). This section outlines each of the five phases and includes the sample of students, their ages, where they were from, and what their stages of education were.

Figure 1. Methodological phases and aims addressed at each phase.

Methodological Phase		Aims addressed
One	Preliminary examination Critical reviews of literature	To examine the extent to which professional self-confidence has been addressed in health education research, the position of self-confidence in educational psychology research, and how it is fostered in chiropractic education, through a critical review of literature. To examine previous research on the impact of guided clinical practice on the professional self-confidence of health care students through a critical review of literature.
Two	Questionnaire and scales development, and establish links with similar chiropractic programs	To develop a confidence questionnaire with two new scales measuring situation-specific self-confidence for chiropractic students during their clinical internship and to establish the psychometric properties of these scales
Three	Questionnaire distribution and collection In-depth individual student interviews	To determine the key aspects that influence self-confidence by conducting in-depth interviews about self-confidence.
Four	Psychometric analysis of the scales	To develop a confidence questionnaire with two new scales measuring situation-specific self-confidence for chiropractic students during their clinical internship and to establish the psychometric properties of these scales.
Five	Questionnaire data analysis	To investigate the impact of various factors on level of self-confidence,

Student interview data analysis	including the effects of gender and age, experience in the profession, and entry qualifications. To identify key factors during the clinical internship that appears to have increased or decreased professional self-confidence in patient communication and clinical skills.

Phase One

This phase consisted of two components. The first component was a preliminary examination of the construct, its affect and influence on students and consisted of casual conversations with students who had recently began their clinical placement, a preliminary survey, and informal group interviews with chiropractic students in their fourth year of a five year program at an Australian university. The second component consisted of two critical reviews of literature. The following section outlines each in greater detail.

Preliminary examination

Casual conversations with chiropractic students revealed that self-confidence was a crucial factor during their clinical internship, notably impacting their patient communication and clinical skills. The students also mentioned clinicians as a primary factor affecting their self-confidence including how they spoke to them, and interacted with them whilst in the presents of a patient. This feedback led to the development of a rudimentary survey with eight open-ended questions, which was distributed to a cohort of chiropractic students (n=56, 29 male, 27 female) at an Australian university with 37 between the age of 18-25, 15 between the age of 26 and 35, and 4 who were 36 years and older. The cohort consisted of fourth year (of a five year program) students who had recently begun their clinical internship. They were chosen due to their proximity to me, though I was not involved in teaching them that year. The survey was distributed during one of their lectures (consent was granted by the lecturer) and was voluntary. The researcher was not present during the distribution or collection of the survey.

The survey sought to gain further insight into and information about the issues students faced during their clinical internship and how these affected their self-confidence. Additionally the survey requested students who were interested in participating in focus group interviews to indicate this on the survey and leave contact details. Students who indicated they were interested in the focus group interviews were contacted and any questions and concerns they had were addressed. Following this, two focus groups, comprising five and eight participants, (6 males, 7 females; 9 age between 20-25, 3 age between 26-35 and 1 older than 36) which were recorded with participant consent, were held. The questions posed to the groups were intended to gain a more in-depth understanding of the influences on student self-confidence, in particular the potential impact of past and present experiences. Overall, the data gathered from the casual conversations, open-ended survey, and two focus groups guided the development of items that were included in the self-confidence scale.

Critical reviews of literature

The initial critical review of literature examined the extent of professional self-confidence in health education research, appraising the nature and growth of self-confidence in educational psychology research, and fostering professional self-confidence in chiropractic education. The first body of literature reviewed socially guided educational experiences, such as problem-based learning, guided learning activities including preceptorships/internships, and staff, student or peer mentoring. The second body of literature delineated self-confidence and related self-constructs. The third body of literature analysed the implementation of unique educational methods and opportunities in chiropractic education, which may enhance student confidence in patient communication and clinical skills. These were divided into two key areas: technique-specific methods including unique classroom protocol or mechanical devices, and preceptorship/internship opportunities including outreach experiences, such as sporting events.

A second critical review of literature investigated the impact of guided practice into the profession, on the development of self-confidence in patient communication and clinical skills. This analysis was particularly vital and pertinent due to this research focussing on the preceptorship/internship period. This review examined a range of guided practice opportunities in health professional education programs, emphasising professional self-confidence. Two types of guided practice were evident: short, intensive, practical sessions or courses, and longer preceptorship programs. The main differences being the duration and availability of sustained personal guidance by a mentor or clinician. The efficacy of preceptorship experiences can be organised into four categories: the influence of these experiences on levels of professional self-confidence for both preceptors and students; the relationship between amount of hands-on or active care practice and levels of professional confidence; the importance of exposing students to various preceptorship environments for the development of their professional self-confidence; and the impact of peer-assisted mentoring on levels of self-confidence. Overall, these critical reviews of literature provided the conceptual basis for the development of the self-confidence scale, which is further detailed in phase two.

These reviews are presented in Paper one and two in brief in Chapter 3 and in full as Appendix A and B.

Phase Two

This phase consisted of the development of an instrument to measure situation-specific self-confidence, namely a questionnaire and two new scales, and links with several similar chiropractic programs to involve their students in completing the questionnaire.

Questionnaire and scales development, and establish links with similar chiropractic programs

The data garnered from the varied informal student group interviews and the critical reviews of literature helped shape the content and objectives of the self-confidence scale and eventual confidence questionnaire. Items and format were developed after careful review of related scales (Esterl et al., 2006; Hayes et al., 2004; Poirier et al., 2004; Goldenberg et al., 1997; Fox, Clark, Scotland & Dacre, 2004) and health education research, which demonstrated different ways to assess professional self-confidence in educational or clinical internship settings (Elzubeir & Rizk, 2001; Evans, Wood & Roberts, 2004; Laschinger, McWilliams & Weston, 1999; Rees, Sheard & McPherson, 2004; Ytterberg, et al., 1998). Whilst these

studies did not mirror the aims of this research, they provided vital evidence regarding the importance of professional self-confidence in health education programs.

Accordingly, a preliminary survey instrument of 52 items or statements was developed with a primary focus on patient communication and clinical skills, and due to their role in self-confidence, which was identified through the informal interviews and critical review of literature, a secondary focus on supervising clinicians. A six-point Likert-style response format for each item was utilised. Response categories were coded from 1 to 6, "not confident at all" to "very confident". The questions reflected interactions and experiences with patients that they were likely to encounter, and ranged from discussing general health issues to performing basic and focused physical examination procedures. For example: "How confident are you in your ability at discussing personal and/or sensitive issues with new patients?"; and "How confident are you in your ability to perform basic physical examination procedures such as blood pressure, pulse and respiration rate on a patient?" The content validity was assessed by a panel of educators and researchers affiliated with education programs and chiropractic clinical education internship programs in Australia and the United States. Panel members were asked to review the scale and comment on each item and the overall format. They suggested minor alterations for a few items, and recommended the inclusion of a demographic section and a self-reflection section that invited the students to qualify their responses (full questionnaire is provided as APPENDIX E).

The scale was divided into two parts. One part of the scale focussed on patient communication, labelled the Patient Communication Confidence Scale (PCCS). The other part focussed on clinical skills, labelled the Clinical Skills Confidence Scale (CSCS). The two scales represent different aspects of self-confidence, both of which are important, and more diagnostic information about these two different aspects could be gained by measuring them separately and thus being able to see whether levels differ. If this were so, it may be that different teaching strategies could be aimed at developing each aspect. It is an empirical question whether the two scales could be conceived as representing the same construct and for some purposes a single score may be all that is required to make teaching and learning decisions. However, in this case, the research aimed to get information about each of the two aspects as they are each essential and are likely to require different strategies to address them. A Rasch analysis could be run on all the items together to see if they can be considered one scale, but this was not seen as pertinent to the present study.

To assist with the eventual validation process, two existing valid and reliable scales were incorporated, the Personal Report of Communication Apprehension (PRCA-24) and General Self-efficacy (GSE) scales. A component of the PRCA-24 scale was added, the Interpersonal communication sub-scale, to measure the student's feelings about communicating with other people. The GSE scale was added to gather data regarding the generalised self-efficacy of the students, and to compare their general self-efficacy and specific task-related self-efficacy measures. It was expected that the PCCS and CSCS would correlate positively with the GSE and negatively with the PRCA-24 Interpersonal communication sub-scale; however, not very highly because they are designed to assess constructs that are similar but not identical to self-confidence. The final confidence questionnaire contained the following:

1. General Self-efficacy Scale (GSE)
2. Personal Report of Communication Apprehension Scale (PRCA-24), Interpersonal communication sub-scale

3. Patient Communication Confidence Scale (PCCS), 28 items, 6 response categories, no reverse items
4. Clinical Skills Confidence Scale (CSCS), 27 items, 6 response categories, no reverse items
5. Self-reflection section
6. Demographic section

The confidence questionnaire was distributed within several chiropractic programs with similar curricula and clinical opportunities. Therefore, concurrent with its development, eleven chiropractic programs (three in Australia, one in Canada and seven in the United States) were contacted in order to establish if they had similar curricula, similar student clinical experience, and the ability to administer the questionnaire. This involved reviewing the pre-clinical curricula and the clinical experience, gaining ethical approval from each program, and checking the feasibility of an error-free distribution and collection method. In total, seven chiropractic programs were selected, five located in the United Sates and two in Australia. Of the five United States programs, two administered the questionnaire in 2006 and three administered the questionnaire in 2007. The key individuals in these programs, who distributed, collected and returned the questionnaire to the researcher, were identified. The two Australian programs were in the same institution, and the questionnaire was administered to two separate cohorts in 2006 and 2007 in order to increase participant numbers.

The development of the scales is described in Paper 3 which appears in brief in Chapter 3 and in full as Appendix C.

Phase Three

This phase, which occurred over two years, consisted of the distribution and collection of the confidence questionnaire, as well as in-depth individual student interviews that sought to ascertain the factors that increase and decrease the self-confidence of students during their clinical internship.

Questionnaire distribution and collection

For the distribution, each questionnaire was placed in an envelope and a letter was attached to the outside detailing the aims of the research, that completing the questionnaire was voluntary and that agreeing to complete it meant that the student had given consent. The questionnaire was distributed to students at or near the beginning of their clinical internship, with a follow-up administration ten months later. In order to match questionnaires, students were requested to use their mother's maiden name, and following the completion of the first distribution each questionnaire was given a number code. Thus, after the completion of the second distribution, each questionnaire was matched with its partner. 269 (out of 517) questionnaires were returned and matched from the seven chiropractic programs. Table 1 provides an overview of pertinent demographic information.

Table 1. Demographic factors from the 269 matched questionnaires.

Factor	Group	N
Gender	Male	153
	Female	116
Age	20-25	136

	26-35	106
	36+	27
Experience	None at all	48
		63
		56
		54
		25
	Extensive	23
Qualification	Possess degree upon entry	153
	No degree upon entry	116
University	1	56/56
	2	33/98
	3	53/69
	4	39/175
	5	28/50
	6	10/18
	7	50/51

In-depth individual student interviews

A qualitative component was incorporated in the research, in the form of in-depth interviews. The term *in-depth interview* reflects the nature of the interview, which allowed for movement between an unstructured and semi-structured approach. These informal individual interviews were deemed an appropriate way of eliciting data on key factors that influence the situation-specific self-confidence of students during their clinical internship, and thus address a central aim. As such, these interviews enabled students to reflect on and express their perceptions, beliefs, attitudes and experiences.

Two separate student cohorts from a single chiropractic program, in Australia, were selected for the informal interviews. This was due to proximity to the researcher and financial reasons. The students who volunteered to be interviewed had been taught by the researcher during the previous year. The interviews were conducted during their clinical year, which is the year in which the students graduate, so the researcher was not scheduled to have any contact with them during and after the interview period. The students were informed that the interviews were confidential and the release of any information pertaining to the research project would not impact on their grades and progress in the course. The other chiropractic programs that distributed the questionnaire were internationally based, in the United States, and conducting multiple interviews with those students would have been financially difficult. However, because the chiropractic programs had similar curricula and clinical opportunities, the data obtained from the informal interviews was considered likely to be representative.

When the confidence questionnaire was distributed to the two separate cohorts, in 2006 and 2007, a letter was attached requesting volunteers for informal interviews. If a student agreed to be interviewed he/she signed the request and provided contact details. In total, 29 students

(14 male, 15 female; 20 were age between 20-25, 5 were between 26-35 and 4 over age 36) out of 106, volunteered to be interviewed. They were subsequently contacted and a convenient time for the first interview was scheduled. During their clinical internship, over 10 months, three semi-structured face-to-face interviews were conducted at regular intervals, with interview one conducted at months one or two, interview two at months five or six and interview three at months nine or ten. These interviews were informal and conversational, and primarily sought to elicit reflections on the factors that may be contributing to increasing or decreasing self-confidence, especially in patient communication and clinical skills. Each interview was scheduled to last 30 minutes and was recorded. For transcription purposes, each student was identified by the number code on their confidence questionnaire. Transcribing was performed by an individual not involved in this research.

Whilst stylistic categories (such as semi-structured or unstructured,) for qualitative interviews can be useful, they are merely typologies and distinctions between styles can become blurred in practice. In the social sciences, qualitative research methods, such as in-depth interviews, emerged from the interpretive tradition (rather than the positivist). Some paradigms that have contributed to the interpretive tradition are grounded theory, symbolic interactionism and phenomenology, and more recently post-structuralism and post-modernism (Broom, 2005). By utilising an interpretative method, a qualitative interview-based study seeks to establish an in-depth understanding of the experiences of respondents and the interpretations or meanings they attach to a particular action, process or event (Wainwright, 1997). Rather than measuring or categorising behaviour or attitudes, a qualitative approach pursues an analysis that seeks to maintain a constructivist ontological position (Broom, 2005). Ontology refers to the study of the nature of existence or reality. A constructivist ontological position claims that reality is constructed rather than determined or objectively measurable and that individuals construct their existence by actively negotiating and associating meaning with certain events, processes or actions (Bryman, 2001). As such, interpretive research is concerned with deciphering what events mean, how individuals adapt, and how they view and express what has happened to and around them (Rubin & Rubin, 1995). This complexity and subjectivity should underpin qualitative interview-based research (Ezzy, 2002).

Accordingly, by approaching the issue of professional self-confidence from this position, this research seeks to understand the meanings that students attach to actions, processes or events during their clinical internship and elucidate any patterns and irregularities. Thus, identify influential factors on levels of student self-confidence in patient communication and clinical skills. Given this core issue, central research questions were developed that aimed to prompt reflections on specific factors (see Table 2). Once a central research question had been asked, working through the experiences of the student and having them reflect on these experiences facilitated a guided conversation. The aim of a guided conversation is to probe or encourage the respondent to talk about an action, process or event, without actually directing them to any particular conclusion (Fielding, 1996). Therefore, depending on the student's response, a series of follow-up questions (or probing) precipitated further reflections, and encouraged a more natural exchange and transition. However, probing questions should not be delicate or embarrassing, and may often entail a simple 'why' or 'how did this make you feel'.

After completing the first round of interviews, the immediate process of analysis, referred to as 'as you go' (Charmaz, 1990; Ezzy, 2002), revealed that students were focussing on and identifying manipulative procedures especially in discussions about clinical skills. They were being very specific about manipulating regions of the body, such as the cervical, thoracic and

lumbar areas. Therefore, this assisted ongoing data collection, and central research questions addressing these issues were prepared for interviews two and three.

Table 2. Interview theme and sub-questions.

Theme: Students reflections on factors that affect their self-confidence in patient communication during the clinical experience.
Central research question:
Interviewer: *I'm not going to describe a particular patient, but how would you depict your confidence at taking a patient's history?*
Student: *I'm fairly confident when all I have to do is ask questions off the history form, but when I have to dig a bit deeper, my confidence is affected.*
Probing questions leading to a guiding conversation with the aim of digging deeper into a key factor (clinician encounter):
Interviewer: *Affected in which way?*
Student: *I'm not as confident, but if I'm alone with the patient, a clinician isn't lurking over your shoulder, I'm usually pretty good.*
Interviewer: *Why would having a clinician in the room affect your confidence in taking a patient history?*
Student: *Not all of them, but one in particular. Dr *** makes you feel like an idiot if you miss something. He'll go, "you're not moving in the right direction, did you think of this, did you think of that".*
Interviewer: *In front of the patient?*
Student: *No, in the clinician's station*.
Interviewer: *Why does this bother you? How is he different from the other clinicians?*
Student: *He talks down to us. He sometimes says things even in front of the patient. Isn't his job to help us and not make us feel like idiots?*
Theme: Students reflections on factors that affect their self-confidence in clinical skills during the clinical experience.
Central research questions:
Interviewer: *During clinic, have you experienced anything recently which has helped or hindered your confidence in your cervical adjustments (manipulation)?*
Student: *At the very start I had a bad stretch with a patient and then, I don't know, I get good at them, and then I miss a few and then my confidence, it just takes one miss and my confidence is back down to zero.*
Probing questions leading to a guiding conversation with the aim of digging deeper into a key factor (audible noise released after a manipulative procedure):
Interviewer: *What about other areas of the body (lumbar and thoracic regions)?*

Student: *I'm pretty damn confident with lumbar and SI's [sacroiliac] and thoracics.*
Interviewer: *What do mean when you say, "miss a few"?*
Student: *I'm saying that all adjustments but in the cervicales if you don't get the release, then it doesn't feel like I am doing anything.*
Interviewer: *So you base your success on the audible?*
Student: *Not the rest of the body, but in the cervicales pretty much.*

Phase Four

This phase consisted of a psychometric analysis of the two new scales (the PCCS and CSCS) using the Rasch measurement model, and an examination of correlations between these scales and two existing scales (the PRCA-24 and GSE). These enquiries were necessary to ascertain whether the two new scales are valid and reliable. These analyses are reported in Paper 3 which appears in brief in Chapter 3 and in full as Appendix C, but what follows now is a brief description of the Rasch model and the procedures involved in the analyses.

Psychometric analysis of the scales

The data initially underwent psychometric analysis using the polytomous Rasch measurement model (Rasch, 1960, 1980), in order to determine whether the two new scales were valid and reliable. The Rasch Unidimensional Measurement Model (RUMM2020) software was used for this (Andrich, Sheridan & Luo, 2001). The Rasch model fulfils the requirements of fundamental measurement (Bond & Fox, 2007) and can be used to examine data for flaws or problems, which are indicated by their failure to fit the model (Conrad, Conrad, Dennis, Riley & Funk, 2009). Due to providing linear scale measures if the data fit the Rasch model, these measures can be used in basic mathematical operations (such as addition), and thus may be used for standard statistical procedures such as those used to investigate change over time or mean differences amongst groups.

In the manual medicine field, the development of psychometrically robust scales that measure professional self-confidence in education programs is vital. Currently, only a few scales exist that could be used for this, and only in part. For example, Vivekananda-Schmidt et al. (2007) describe the development and validation of the musculoskeletal self-assessment tool (MSAT), which is used by medical students to measure self-assessed confidence in knowledge and skills relevant to the examination of the shoulder and knee. While the MSAT is statistically robust and can be used in manual medicine programs, this 15-item scale is limited to two regions of the body and does not extensively delve into patient communication and clinical skills such as other manipulative procedures. Other scales used to assess student confidence during a clinical internship or preceptorship were also not as inclusive of common manual medicine skills, such as the 'report of findings', which is an aspect of patient communication.

Although research in many fields which employ psychometric methods seems mainly based on traditional test theory, in health education research particularly, the use of modern methods such as the Rasch measurement model is becoming more frequent. In this research, the scales were conceptually grounded in the Rasch measurement model (Rasch, 1960/1980), which provided a rigorous basis for psychometric analysis.

The Rasch model has been applied often in education research, but is now used in a range of disciplines and increasingly in health sciences research (Cano et al., 2008; Hagquist, Bruce & Gustavsson, 2009; Keenan, Redmond, Horton, Conaghan & Tennant, 2007; Ramp et al., 2009; Shea, Tennant & Pallant, 2009; Stewart-Brown et al., 2009). The model is used in the development and analysis of measurement instruments, and because the model reveals anomalies in data that would otherwise be addressed qualitatively, it can be regarded as filling a gap between research methodologies representing different epistemological traditions (Hagquist, Bruce & Gustavsson, 2009).

Rasch analysis is a probabilistic mathematical modelling technique used to assess properties of outcome measures, including unidimensionality (the extent to which items measure a single construct), item difficulty (the relative difficulty of items when compared to one another), and person separation (the extent to which items differentiate levels of functioning). The Rasch model is the current standard for the development of unidimensional scales delivering metric quality outcomes in health care (Tennant, McKenna & Hagell, 2004). Data collected from ordinal questionnaires or scales, which are to be summated into an overall score, are tested against the expectations of this model. The model defines the ideal item response characteristics if measurement is to be achieved. The observed response patterns achieved are tested against expected patterns (a probabilistic form of the 'Guttman scale') (Guttman, 1950), and various fit statistics determine whether fit is adequate to the model (Hunt, Fahey & Smith, 2000).

Early in this research, an exploration of health education studies that examined professional self-confidence during clinical internships or preceptorships, revealed that most were based on traditional test theory. For example, as shown by Lyon et al. (2008) when describing the development and analysis of their scales which measure students' perceptions of clinical attachments across rural and metropolitan settings. Other studies provided limited background information about the instruments used (Goldenberg et al., 1997), and some provided none. For example, Elzubeir and Rizk (2001) assessed confidence and competence using an instrument that had been previously applied by Ytterberg et al. (1998). However, Ytterberg et al. did not describe the development of the confidence scale. This lack of detail can be understood. The primary aim of these studies was to measure and examine changes in confidence for students during their internship or preceptorship, and a description of the development and analysis of scales was perhaps regarded as incidental. There are some exceptions, including Mason and Ellershaw (2004), Lai et al. (2007) and Vivekananda-Schmidt et al. (2007). These studies described the psychometric properties of self-efficacy scales for medical students, and carefully explained the data analysis, and assessment of validity and reliability. Another example is a study by Harguist, Bruce and Gustavsson (2009) that used the Rasch model in an illustrative example of a scale intended to measure the self-efficacy of nursing students.

In this research, the analysis using the Rasch model was augmented by the use of two existing valid and reliable scales, the Personal Report of Communication Apprehension (PRCA-24) and General Self-efficacy (GSE) scales. The PRCA-24 scale consists of 24 items, although only the Interpersonal communication sub-scale was incorporated in this research, in order to measure the feelings of participants about communicating with other people. An analysis of research supports the content and criterion validity of the scale (McCroskey, Beatty, Kearney & Plax, 1985), and since its development, the PRCA-24 and variants have been administered to over a quarter of a million people. In addition, general self-efficacy

instruments, like the GSE, assess general confidence in succeeding at tasks and in situations, without specifying what these are. These instruments provide a global score that decontextualises the response and transforms self-efficacy into a generalised personality trait rather than a context-specific judgement (Bandura, 1986, 1997). The GSE scale was created to gauge levels of coping with daily hassles, and adaptation after various kinds of stressful experiences or events (Schwarzer & Jerusalem, 1995). It was incorporated in this research to measure the generalised self-efficacy of participants, and to compare their general self-efficacy and specific task-related self-efficacy measures. An analysis of research about this scale has been generally positive (Scherbaum, Cohen-Charash & Kern 2006), reporting internal consistency coefficients from .75 to .91, from various samples and countries, and variable stability coefficients from .47 to .75, from longitudinal studies (Scholz, Gutiérrez-Doña, Sud & Schwarzer, 2002).

These two existing scales were incorporated due to the relevance of the inherent constructs, and to help ascertain the validity and reliability of the two new scales by correlating the scores on these older scales with scores on the new scales. The expectation was that there would be a positive correlation between the confidence scores for patient communication and clinical skills, and general self-efficacy, and a negative correlation between the confidence scores for patient communication and the Interpersonal communication subscale. These correlations were not expected to be very high, because the scales were designed to assess constructs similar to confidence, but not identical.

There were no identified difficulties with the distribution and collection of the confidence questionnaire. In total, 269 questionnaires were collected (from a total of 517), and all data was entered onto an Excel spreadsheet for analysis. It was anticipated that data analysis would reveal what items should be revised or deleted, if any, and what items should be retained.

The following aspects of the scales were analysed: item thresholds, item fit, Differential Item Functioning (DIF), targeting, item locations, item dependencies and reliability. These aspects are outlined below.

Item Thresholds: Do the response categories operate as required? In other words, are the item thresholds (the cut-points between each successive pair of categories (such as, Strongly Agree and Agree)) ordered correctly? Item thresholds are estimated parameters which indicate the location of the item in relation to the latent construct. In this context, the threshold provides a measure of self-confidence in either patient communication or clinical skills. Under the conventions of the Rasch model, the item thresholds are scaled so that their arithmetic mean is zero. Figures 2 and 3 illustrate a Category Characteristic Curves (CCC) for an item with ordered categories, the thresholds (the cut-points between each successive pair of categories) being ordered correctly, and an item with disordered categories, respectively.

Figure 2. A Category Characteristic Curves (CCC) for an item with ordered categories: PCCS question number 11(…*at discussing health risk behaviours such as poor diet, the use of drugs and lack of exercise with patients*). This illustrates the thresholds (the cut-points between each successive pair of categories) being ordered correctly.

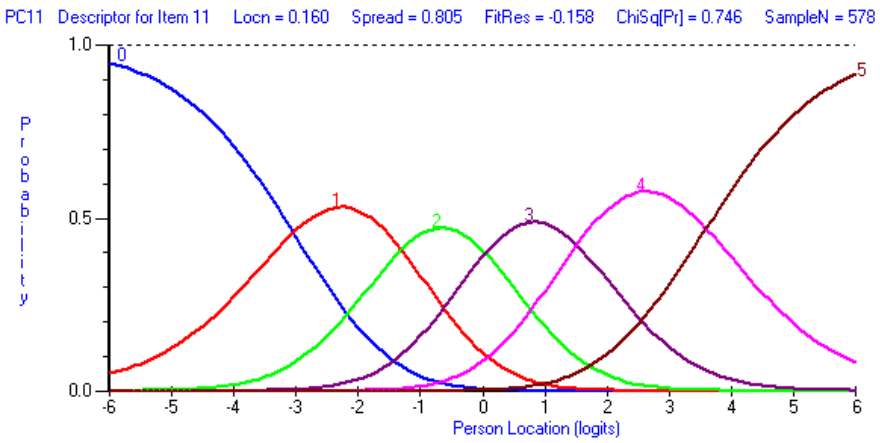
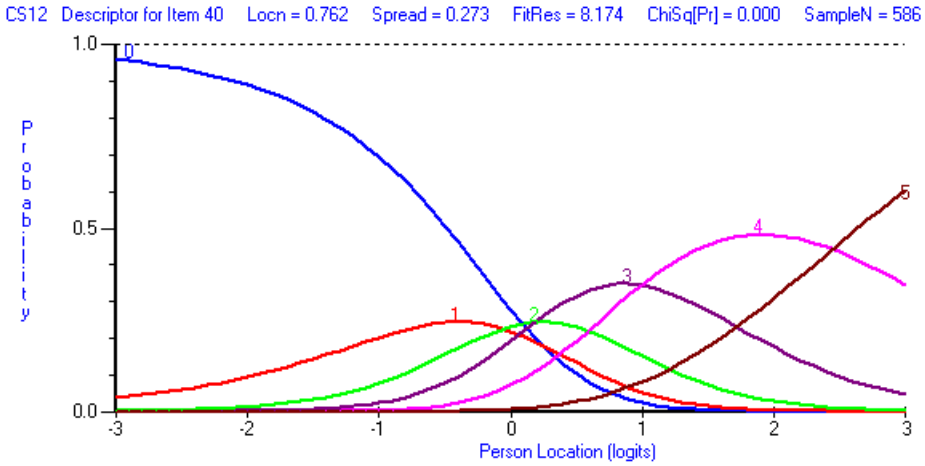


Figure 3. Category Characteristic Curves (CCC) for an item with disordered categories: CSCS question number 12 (…*in your ability to apply taping (strapping) techniques on a patient*). This illustrates the thresholds (the cut-points between each successive pair of categories) being disordered.



Item Fit: Do the items in each scale fit the Rasch model? If so, then the items can be accepted as measuring a single variable at this level of scale, providing evidence of validity (internal consistency).

Three tests of fit are used to judge this, two statistical tests (log-residual and item-trait interaction) and one graphical test (Item Characteristic Curve, ICC). An ICC shows the expected and obtained scores for groups of participants across the entire range of total person locations (or total scores). Multiple tests of fit are applied because in the Rasch paradigm no one test is sufficient to make a decision about fit. Figures 4 and 5 illustrate an Item Characteristic Curve of one item which is mis-fitting and one which fits well, respectively.

Figure 4. Item Characteristic Curve which illustrates a mis-fitting item.

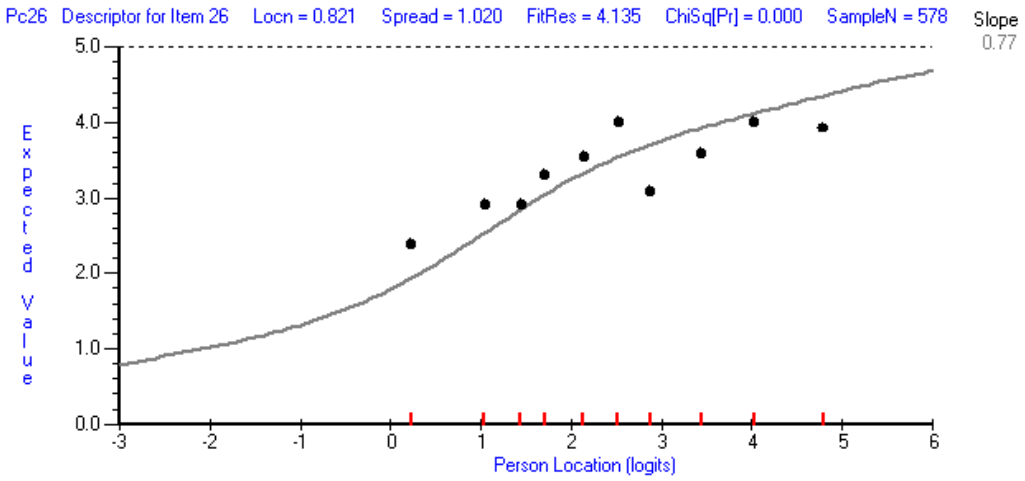
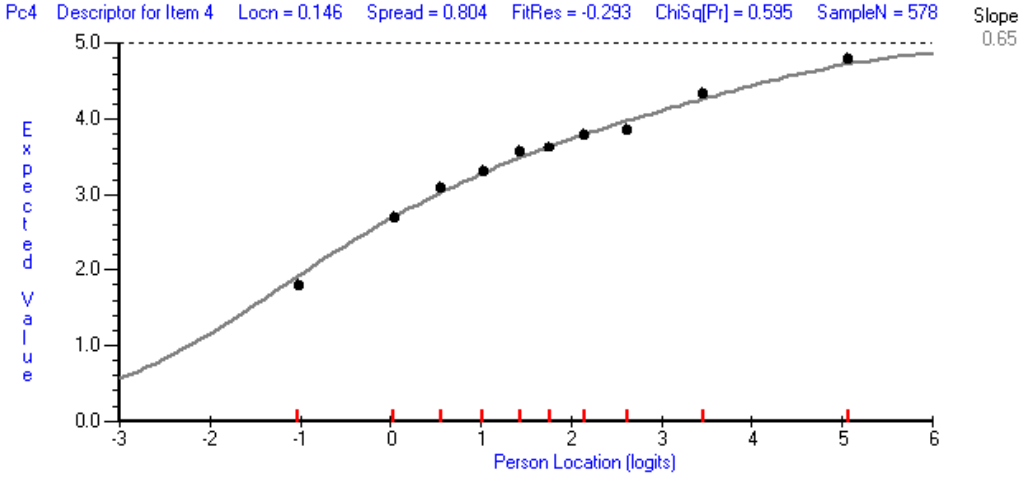


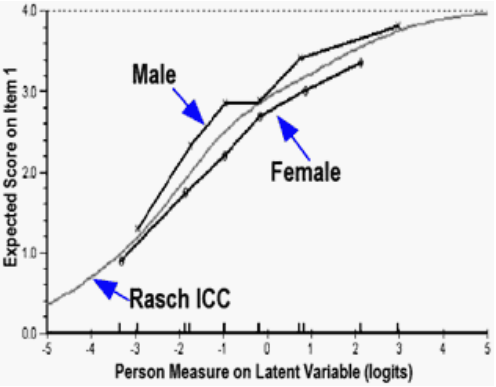
Figure 5. Item Characteristic Curve which illustrates a well-fitting item.



Differential Item Functioning (DIF): Do any items show DIF according to any of the groups of interest? ANOVA is used to gauge this, and graphical inspection (using an ICC) helps distinguish any found patterns of difference. DIF determines whether each scale could represent the same construct across different groups of participants. If items show DIF across groups, they should not be used to compare group or individual performance, unless individuals are from the same group. In this study, the groups of interest were gender, age, experience, entry qualification (previous degree or not), and occasion of administration.

DIF occurs when different groups of respondents (e.g. males and females) respond differently to an individual item, despite having the same level of the underlying trait (Tennant & Conaghan, 2009). This is important because DIF can be considered a breach of unidimensionality and so items displaying substantial DIF would be considered for removal from the scale (Pallent, Miller & Tennant, 2006). Figure 6 illustrates how uniform DIF puts one group to the left (males) side of the Rasch ICC, and the other group to the right (female) side.

Figure 6. This picture illustrates how uniform DIF puts one group to the left (male) side of the Rasch ICC, and the other group to the right (female) side. Tennant, A., & Pallant, J.F. (2007). DIF matters: A practical approach to test if Differential Item Functioning makes a difference. *Rasch Measurement Transactions*, 20:4, 1082-84.



Targeting: Are the items and persons targeted to each other, that is are they not too easy or too difficult? This is judged by an inspection of Person-Item Threshold Distribution location distribution histograms as illustrated in Figures 7 and 8.

Figure 7. The Person-Item threshold distribution (for patient communication confidence) plots person location logits and item thresholds on the same scale. The distribution of thresholds (bottom plot) matches the distribution of self-confidence confidence scores (top plot) fairly well, although 34 of the students had high self-confidence scores, the highest item threshold location was not this high.

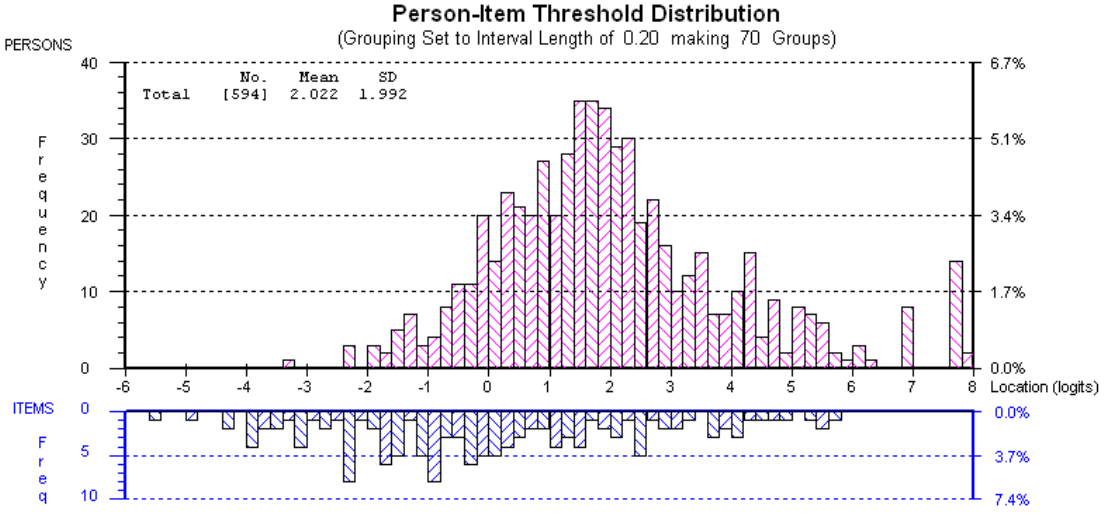
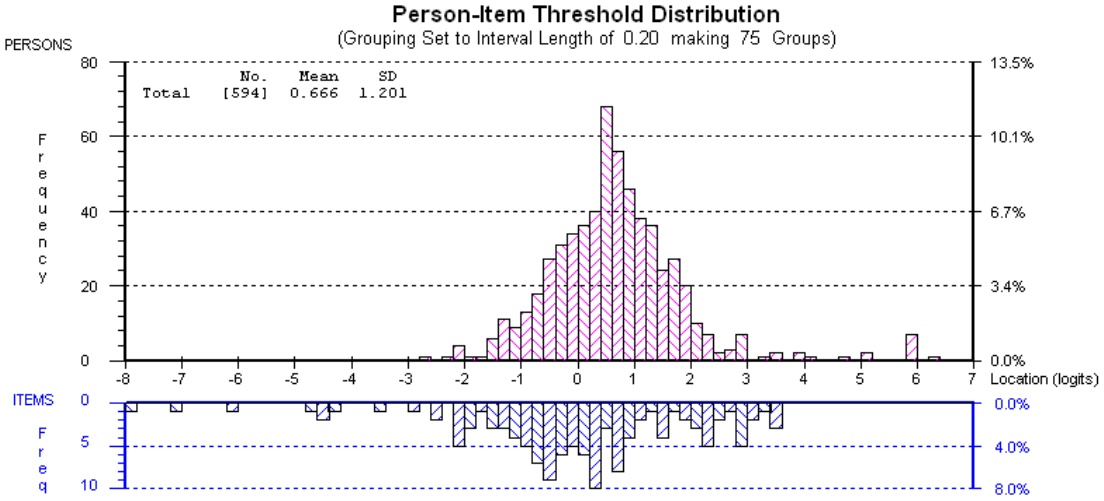


Figure 8. The Person-item threshold distribution (for clinical skills confidence) plots person location logits and item thresholds on the same scale. The distribution of thresholds (bottom plot) matches the distribution of self-confidence confidence scores (top plot) fairly well, although the scales would benefit from more intense items to measure highest-scoring (most confident) people more reliably.



Item Locations: Item location, in other words item difficulty, refers to the level of the underlying trait (or location on the trait scale) that the item measures most precisely. Item location is determined by the frequency with which an item is endorsed or is answered in a particular way. For example, in this study, persons with relatively low levels of confidence are likely to agree with these types of items. Alternatively, the highest location (most intense) indicate items that require a high level of confidence to agree with. Table 3 demonstrates the ordering of fours item locations (measured in logit units) according to increasing intensity as expected.

The ordering of item locations should be approximately according to intensity as expected. This is judged by inspection of the locations of items (measured in logit units). In the table below is an example of four items from the Clinical Skills Confidence Scale (CSCS) in order of increasing intensity. Item 23 is easier for students to agree with as opposed to item 27 which only students with high levels of clinical skills confidence would agree with.

Table 3. Item locations for four CSCS items. Item 23 and 7 are on the lowest end of this table and represent items which are easy for participants to agree with. Item 12 and 27 are on the lowest end of this table and represent items which would require a higher level of self-confidence to agree with.

Item number (How confidence are you in your ability at…)	Location (logits)
Item 23. (…*performing spinal manipulative procedures on a new patient while being observed by a clinician whom who are comfortable with*)	-1.710
Item 7. (…*performing a focused and detailed extremity examination on a patient which includes observation, orthopaedic and neurological procedures*)	-0.01
Item 12. (…*in your ability to apply taping (strapping) techniques on a patient*	1.665
Item 27. (…*to perform spinal manipulative procedures on a patient who had been successfully manipulated by a clinician after a failed attempt by you*)	1.732

Item Dependencies: Do particular pairs of items show significant dependency? In other words are items related to each other beyond the shared underlying construct? If so, then one item in the pair is redundant, and retaining both items will artificially increase the reliability of the scale. Item dependencies are identified by inspection of the residual correlations between items.

Reliability: Are the scales reliable? The Person Separation Index, which is the Rasch equivalent of Cronbach's alpha statistic, is used to gauge this.

In order to provide further evidence of the validity of the two scales, scores were correlated to two existing scales whose validity has been established, the General Self-efficacy scale (GSE) and one subscale (Interpersonal conversation) from the Personal Report of Communication Apprehension scale (PRCA-24).

Accordingly, if analyses of the above aspects are acceptable, then the person locations (the linearised raw scores) can be used in further analyses, such as comparisons of mean locations amongst groups of interest, which was an element of the final phase.

Phase Five

This phase consisted of statistical analyses of the student locations (Rasch scores) on the two confidence scales including the measures of initial levels of professional self-confidence and changes in these over time, and qualitative analyses of the student interview data to identify factors that increased or decreased professional self-confidence during students' clinical internships.

Questionnaire data analysis

Empirical data, garnered from the administration of the confidence questionnaire in seven chiropractic programs, was examined utilising analyses of variance (ANOVAs) in order to assess the effects of age, gender, prior experience in the profession, and previous qualifications (or possession of a first degree) on initial levels of self-confidence in patient communication and clinical skills. The person locations (equivalent to total scores) from the Rasch analyses were used for this purpose. Ensuing changes in levels of professional self-confidence were investigated using multiple analyses of variance (MANOVA), with repeated measures for time. Comparisons between the chiropractic programs were not intended to be a part of the research and are not reported here. It is unlikely that there would be differences due to the similarity in culture and program experience.

These analyses are reported in Paper 4 which is described briefly in Chapter 3 and is presented in full in Appendix 4.

To better understand the changes in levels of professional self-confidence, two extreme sub-groups of students from the same educational context were identified on a normative basis (n=106) with one sub-group displaying the greatest increase in professional self-confidence and the other sub-group displaying the least increase. Using this normative basis, students were assigned to the greatest increase category if their score on the PCCS or CSCS scales increased from the lower to mid 33% of the whole range of scores or numbers of students at the beginning of their clinical internship to the upper 33% at the end of their clinical

internship. Reciprocally, students were assigned to the least increase category if their scores on the scales decreased from the upper to mid 33% at the beginning of their clinical internship to the lower 33% at the end of their clinical internship.

Of these 106 students, 24 students displayed either greatest or least increase in confidence on either the PCCS or CSCS scale, or on both. Of these 24 students, 12 students had been interviewed, and by chance six students were assigned to the greatest increase category, PCCS (n=3), CSCS (n=2) or both (n=1), and six students were assigned to the least increase category, PCCS (n=3), CSCS (n=0) or both (n=3). A general thematic analysis of these 12 interviews occurred at the completion of the first round of interviews, primarily to determine if common themes were emerging and to refine central research questions if needed. A detailed in-depth analysis only occurred after all interviews were completed.

Student interview data analysis

A thematic analysis of qualitative data, gathered from informal interviews with two separate cohorts of students (n=12) from a single chiropractic program, was undertaken to identify key factors that impact self-confidence in patient communication and clinical skills. There was no significant difference between the two cohorts. Thematic analysis or interpretive thematic analysis (Braun & Clarke, 2006; Markovic, 2006), is delineated as a qualitative analytic method that is utilised "for identifying, analysing and reporting patterns (themes) within the data" (Braun & Clarke, 2006, p. 79). Qualitative analytic methods can be roughly divided into two camps (Braun & Clarke, 2006). The first camp includes methods that stem from or are tied to a specific theoretical or epistemological position. For some, such as conversation analysis (Hutchby & Wooffitt, 1998) and interpretative phenomenological analysis (Smith & Osborn, 2003), there is limited variability in how the method is applied within that framework. For others, such as grounded theory (Glaser, 1992; Strauss & Corbin, 1998), discourse analysis (Burman & Parker, 1993; Potter & Wetherell, 1987; Willig, 2003) and narrative analysis (Murray, 2003; Riessman, 1993), there are different manifestations of the method within the broad theoretical framework. The second camp includes methods that are regarded by proponents as being essentially independent of theory and epistemology, and can be applied *across* a range of theoretical and epistemological approaches. In terms of thematic analysis, although it is often framed as a realist/experiential method (Aronson, 1994; Roulston, 2001), it is actually firmly in this second camp, and is compatible with both essentialist and constructionist paradigms within psychology (Braun & Clarke, 2006). Due to its theoretical freedom, thematic analysis is a flexible and useful research tool that can potentially provide a rich and detailed, yet complex account of data (Braun & Clarke, 2006), and also often is used to interpret various aspects of the research topic (Boyatzis, 1998). Accordingly, for these reasons, it was resolved to utilise this method in this research.

In comparison, thematic analysis differs from other analytic qualitative methods that seek to describe patterns across data, such as interpretative phenomenological analysis, discourse analysis, grounded theory and thematic decomposition analysis. For example, interpretative phenomenological analysis and grounded theory are theoretically bounded. For example, the former is tied to phenomenological epistemology (Smith, Jarman & Osborn, 1999; Smith & Osborn, 2003), which is concerned with investigating everyday experiences of reality (Holloway & Todres, 2003), in order to gain an understanding of the phenomenon in question (McLeod, 2001). The latter is complex and comes in different versions (Charmaz, 2002), but aims to generate a plausible and useful theory of the phenomena that is grounded in the data (McLeod, 2001). In terms of the techniques for analysing data, grounded theory and thematic

analysis are broadly similar. The main difference is that grounded theory includes theoretical sampling (Charmaz, 2006; Morse, 2007) and thematic analysis does not. In other words, theoretical sampling is the process of choosing new research sites or research cases to compare with one that has already been studied. The goal of theoretical sampling is not the same as with the probabilistic sampling; the researchers goal is not the representative capture of all possible variations, but to gain a deeper understanding of analysed cases and facilitate the development of analytic frame and concepts used in his research (Ragin, 1994).

According to Braun and Clarke (2006), thematic analysis comprises six phases: these phases were applied to the interview data in this study to identify key factors that impact student self-confidence in patient communication and clinical skills. Of note, some of these phases are similar to the phases in other qualitative methods, so these are not wholly unique to thematic analysis. The process begins with the researcher looking for and noticing patterns of meaning and issues of potential interest in the data, which may start during data collection. The process ends with the researcher reporting on the content and the meaning of patterns (or themes) in the data, whereby "themes are abstract constructs the investigators identify before, during, and after analysis" (Ryan & Bernard, 2000, p. 780). Throughout the process, there is a constant and fluid movement throughout the entire data set and between phases. This is indicative of qualitative analysis, which is shaped by basic precepts or guidelines that are flexibly applied to fit the central research questions and data, rather than comprised of rules (Patton, 1990). Thus, it is not a *linear* process, where the researcher moves through the phases consecutively. Instead, qualitative analysis is a *recursive* process, where the researcher moves forward and backward through the phases as needed. It also requires time to develop (Ely & Vinz, 1997), and should not be rushed.

In this research, the first phase involved becoming familiar with the data. This occurred after each interview and particularly after the first round of interviews with a review of transcripts. This immediate or 'as you go' process of analysis, moulded a general idea of the topics and issues that students were discussing, and revealed some key areas that enhanced subsequent interviews. When all interviews were completed and the 12 sets of transcripts were identified from the students who also completed the confidence questionnaire, each transcript was read through several times, and meanings and emerging patterns were detected. The second phase involved coding and the production of initial (open) codes, which has an imperative role in thematic analysis and also in grounded theory. The process of coding is where the researcher defines and categorises the data, in order to facilitate further examination (Charmaz, 2006). As such, a researcher performs initial (open) and axial coding, which analyses the data and codes key points or concepts, in order to relate data and find links (Boeije, 2009; Saldana, 2009). However, to an extent, the process of coding depends on whether the overall themes are data-driven or theory-driven. If data-driven, the themes depend on the data, and if theory-driven, the data is approached with existing questions in mind and is thus coded (Braun & Clarke, 2006). In this research, the coding was data-driven, and is illustrated in the following interview data.

> Researcher: *So let's discuss your confidence; how you have been over the last couple of weeks, couple of months in regards to your confidence in your skills in adjusting and your communication, how do you feel you've been?*

Student: *After the Argyle trip, and during the Argyle trip, they were at an all record high.*

In this data, the 'Argyle trip' was initially coded with a highlight alongside it, indicating a positive impact on professional self-confidence. However, the phrase 'record high' suggests that the student may have an underlying self-confidence issue.

The third phase involved the process of axial coding, whereby all data was initially coded, a list of different codes was developed, these different codes were sorted into potential themes, and relevant extracts of coded data were then collated under the identified themes. For example, the 'Argyle trip' was further coded as an 'external experience' after other off-campus experiences was brought forth from the students. This phase focussed analysis at the broader level of themes. In other words, axial coding is where the researcher develops links between different codes that were defined and categorised by initial (open) coding (Minichiello, Aroni & Hays, 2008), and then reviews the patterns generated and establishes the emerging themes (Broom, 2005). Strauss and Corbin (1998) define axial coding as forming conceptual connections between a category and its subcategories. In turn, Creswell (1998) describes this process as identifying a central phenomenon, exploring causal conditions, specifying strategies, identifying the context and intervening condition, and then delineating the consequences for the central phenomenon identified.

For example, continuing the above interview, the student draws a comparison between this off-campus experience (the 'Argyle trip') and her on-campus clinical internship, which is the primary clinical experience for chiropractic students.

> *Argyle was a class trip where eight students went away to the mines for two weeks, basically operated at a ratio of one clinician to three students and had the opportunity to, unlike this clinic, where you might see three patients a day on a good day, we were seeing probably twenty new patients in a week.*

In this data, the phrase 'unlike this clinic' clearly connotes noticeable differences between the two clinical experiences, which is an example of initial (open) coding. Similar to the previous data, where the phrase 'record high' was used, she is expressing some aggression towards the on-campus student clinic and then she provides reasons why the off-campus experience was superior to the on-campus experience. As such, with the external experience being positive and key reasons identified, certain themes started to emerge, which led to the following axial coding: 'external experience, positive, more patient encounters' and 'external experience, positive, clinician to student ratio'. Also, another emerging theme was the on-campus student clinic being negative with various reasons indicated. Concurrently, data from other student interviews revealed similar reflections, thereby building a theme that certain aspects of the on-campus experience were impacting professional self confidence in a negative way.

The fourth and fifth phase involved reviewing, refining and naming the different themes that were identified during initial (open) and axial coding, and then developing a 'thematic map' and assessing whether it reflected the meanings evident in the data set as a whole. In this research, the 'thematic map' contained the various themes that affected student professional self-confidence and emphasised aspects of these themes that were helpful or a hindrance. The sixth phase involved publication of a manuscript with the aim of providing insight into the

factors perceived by students as affecting the development of professional confidence during internships

The key factors that impacted student self-confidence in patient communication and clinical skills are discussed in detail in the Main Findings and Discussion chapter and described in Paper 4 which appears in brief in Chapter 3 and in full as Appendix D.

3 SUMMARY OF THE ARTICLES

3.1 Introduction

The broad aim of the dissertation was to examine the construct of self-confidence and its influences on students in health professional programs during their clinical experience. The focus was on situation-specific self-confidence in communicating with patients and application of clinical skills and involved primarily chiropractic students, but was envisaged as being able to encompass students in similar health professional programs such as osteopathy, physical therapy and athletic training. Each paper is an aspect of the research and highlights different facets of the aims beginning with the critical reviews of pertinent literature, followed by the development and psychometric analysis of self-confidence scales, and concluding with an investigation of the factors which affect or are associated with self-confidence.

In this section each paper is summarised in turn, including its link to the aims of the research. The full papers are presented as Appendices A, B, C, and D.

3.2 Summary of Paper 1:

Hecimovich, M., & Volet, S. (2009). The importance of building confidence in patient communication and clinical skills among chiropractic students: A literature review. *Journal of Chiropractic Education*, *23*(2), 151-64.

This paper reviews three distinct but interrelated bodies of literature in order to provide a greater understanding of why fostering confidence is vital in the educational process. In doing so it addresses the first aim of this research. The three bodies of literature as well as the corresponding aim are: an examination of the extent of professional confidence in health care research; the nature and development of confidence in educational psychology research; and fostering professional confidence in chiropractic education.

The first body of literature, that dealing with professional confidence in health care research, revealed that socially guided educational experiences such as problem-based learning (Fenwick, 2002), staff mentoring (Davis, Little and Thorton, 1997), and student or peer-mentoring (Flynn, Marcus and Schmadl, 1981; Kerr and MacDonald, 1997) may help develop student confidence in patient communication and clinical skills. Overall, the clinical experience or preceptorship appears to be the most significant in the building of confidence during a student's tertiary experience. One key component of the preceptorship is the professional, or clinical supervisor, who supervises and manages students' learning during these opportunities. The close professional relationship, which develops between the student and clinical mentor, if successful, is expected to create an environment that encourages student confidence and participation (Curtis, Helion and Domsohn, 1998).

The second body of literature, dealing with the nature and development of confidence in educational psychology research**,** highlighted? the association between confidence and self-

efficacy. Because of this relationship, it is important to understand the nature of development of self-efficacy and in particular, Bandura's (1986) social cognitive theory seems pertinent in this regard. He defined self-efficacy as a person's judgments of their capabilities to organize and execute the courses of action required to attain designated types of performance and postulated that it stems from four sources: vicarious experience; verbal or social persuasion; physiological states; and enactive mastery experience. Each of these sources is expected to be relevant to the development of confidence in health care education including chiropractic education.

The search for confidence and health care research yielded a large body of work, with medical and nursing leading the way, and chiropractic education having only a few. Key areas of research have focussed on the relation of confidence to clinical reasoning and its affect on performance of clinical and communication skills. In regards to the latter there is evidence that confidence in one's ability (skills) to be effective is a powerful reinforcement for any activity (Wechsler, Levine, Idelson, Rohman & Taylor, 1983). As skills improve, confidence increases, and both contribute to enhanced performance (Pommerenke & Weed, 1991). Confidence in patient communication has been shown to be a factor in patient outcomes (Parle, 1997) by revealing that physician's ability in communicating and relating with their patients facilitated the early detection of emotional problems with prevention of possible psychological complications. The relationship between confidence and being able to communicate with patients and apply requisite skills is influenced by confidence.

The third body of literature reviewed, that of fostering professional confidence in chiropractic education, revealed only a few papers on confidence in chiropractic education. However, a comprehensive review of research on educational methods and opportunities yielded studies showing that these may enhance student confidence in clinical and communication skills. For example, a number of studies have addressed the development of psychomotor skills either with a novel way of classroom set-up or through the use of mechanical devices. Although confidence was not directly addressed in these studies, each is expected to play a role in the development of student confidence in manipulative technique by their implementation into curricula. Chiropractic research addressing the effectiveness of preceptorships is still limited but a few studies have assessed this experience (Ebbets, 2002; Dunn, 2006). Unfortunately confidence was not explored directly in these studies.

Fostering students' confidence in patient communication and clinical skills cannot be underestimated and this should be started well before the commencement of professional practice. This is especially true for the field of chiropractic, which utilises the skill of patient communication and manipulative procedures far more than any other health care fields. Therefore the need for more chiropractic-specific research into the critical role of confidence in effective patient communication and delivery of clinical skills, and how such professional confidence could be best fostered in chiropractic education is warranted.

3.3 Summary of Paper 2:

Hecimovich, M., & Volet, S. (2011). Development of professional confidence in health education: Research evidence of the impact of guided practice into the profession. *Health Education, 111*(3), 177-197.

The aim of this paper was to critically review published research investigating how guided practice into the profession contributes to increased professional confidence in health care students, with a view to identifying the impact of guided practice on its development. It addressed the second aim of this research.

This review was vital to this research in that the development of professional confidence from student to professional depends on a range of factors and opportunities and one of the aims was to investigate the impact of guided practice into the profession on the professional self-confidence of health care students.

The critical review of the final selection of 13 papers represented a broad selection of studies discussing the effectiveness of guided into the profession learning opportunities on students' development of confidence in patient communication and skills, across health care fields of study. Seven of the studies pertained to short, intensive, practical opportunities that varied in duration and methodologies and six pertained to the longer-in-duration preceptorship.

A critical review of short, intensive, practical opportunities revealed evidence that they help build professional confidence, but more empirical data is required to support their effect and to establish what points in time are most likely to produce such effect. Issues such as duration, long-term benefits, the correlation between confidence and actual competence, specific focus on professional confidence, and delivery of educational material need to be examined in order to implement the most appropriate short, intensive practical opportunity.

The review of the preceptorship on professional confidence showed that they can impact positively on students' development of confidence in clinical and communication skills. However, there was some evidence that general confidence levels could also decrease due to stress and anxiety evoked by the real-life learning environment. The research also shows that a preceptorship experience may not enhance students' confidence in all the skills that they have to master. While the hands-on experience in the preceptorship may seem to be a natural confidence builder, it may have little impact due to a lack of adequate clinical experience and responsibilities. This lack of clinical pressure does not challenge students' confidence in key areas such as patient communication and physical examination, and may prevent them from taking a more active role in patient care.

Some research has explored how rural preceptorship experiences compare to experience in university teaching based hospitals. A number of comparative studies revealed that the rural experience is a credible alternative to the traditional university-based hospital, as students are provided with opportunities to see more patients and more varied conditions, thus more hands-on experience. Additionally, the rural experience exposes students to more approachable teachers, which adds weight to the idea that it may also enhance professional confidence. Also important is the level of confidence of the supervising preceptor, or mentor, with evidence supporting higher student confidence levels being reported with those students whose mentor possesses higher levels of confidence. Finally, research on peer-mentoring, as an addition to professionally trained mentors, was found useful to enhance students' confidence in practising their clinical skills with their peers, but the extent to which this confidence extends to the use of clinical skills with patients is inconclusive and requires further investigation.

The primary aim of the various forms of guided practice into the profession is the development of student competence. Nonetheless, there was some evidence in related

research of their beneficial effect on the development of confidence, albeit not always measured in a reliable way. It was also argued that combining quantitative and qualitative evaluations of their effectiveness would provide educators with a greater understanding of the influence of these learning opportunities, and reveal whether some components of a learning opportunity may have a negative influence and others a positive influence.

3.4 Summary of Paper 3:

Hecimovich, M., Styles, I., & Volet, S. Development and psychometric evaluation of scales to measure professional confidence in manual medicine: A Rasch measurement approach. In Review (*Focus on Health Professional Education*)

This empirical paper describes the development and psychometric analysis of two new scales, one to measure confidence in patient communication and the other to measure confidence in clinical skills for students in manual medicine programs during their clinical internship. Given that the availability of psychometrically robust instruments to measure professional confidence in manual medicine education is limited, the development of reliable scales is essential. This paper addressed the third and fourth aim of this research. The third aim was addressed by exploring the key aspects that influence self-confidence through informal student group interviews. This was essential to assist in the development of scale items. The fourth aim was addressed by developing two new scales measuring situation-specific self-confidence for chiropractic students during their clinical internship, and establishing the psychometric properties of these scales.

The analytical approach used was the Rasch measurement model (Rasch, 1960/ 1980), which is increasingly used in the development and evaluation of clinical tools in health and medical sciences such as rehabilitation science, psychology, nursing and podiatry (Hargquist 2009; Ramp et al 2009; Shea et al 2009; Stewart-Brown et al 2009).

The value of developing valid and reliable measures of students' confidence in both communication and clinical skills during their study is three-fold: firstly, such measures can track changes in levels of confidence in specific skills over time; secondly, measures enable an examination of the degree of congruence between confidence and competence; and thirdly, measures allow the identification of both over- or under-confident students.

The use of students' reflections on the impact of the internship on the development of confidence, and input from an expert panel of international educators, guided the development of two new confidence scales. The Patient Communication Confidence Scale (PCCS, 28 items) and Clinical Skills Confidence Scale (CSCS, 27 items) were generated with all items formatted in similar fashion to those found in the literature (Hayes et al 2004; Poirier et al 2004). In edition the inclusion of two existing valid and reliable scales, the Personal Report of Communication Apprehension scale (PRCA-24) and the General Self-efficacy scale (GSE) were included to assist in the validation process, as well as a demographic and self-reflection section. These were compiled as a six-part Confidence Questionnaire (CQ) and distributed to participants in seven cohorts of chiropractic students enrolled in clinical internships at the time of the study. All cohorts had comparable clinical

curricula providing similar professional experiences. The CQ was administered at the beginning of their clinical internship with administration repeated ten months later in order to measure change in confidence over time which was reported in subsequent paper. Data from all occasions were used to examine the validity and reliability of the PCCS and CSCS.

269 returned questionnaires were submitted to psychometric analysis using the polytomous Rasch measurement model (PRM) (Rasch, 1960/ 1980) to establish whether the conceptualisation of the two constructs of interest had been operationalised successfully (Andrich & Styles, 2004). The Rasch Unidimensional Measurement Model (RUMM 2020) software (Andrich et al 2001) was employed for this purpose.

Data analysis addressed various aspects of the scales such as *Item thresholds*, *Item Fit*, *Differential Item Functioning*, *Targeting* and *Item Dependencies*. Reliability was determined by the Person Separation Index (PSI) - the Rasch equivalent of Cronbach's alpha.

To provide further evidence of the validity of the two new scales, students' scores were correlated with the same students' scores on two existing scales whose validity has been established, the General Self-efficacy scale (GSE) and one subscale (Interpersonal conversation) from the Personal Report of Communication Apprehension scale (PRCA-24). The results of each aspect are outlined below.

Item thresholds

This examines whether the response categories are operating as required. In other words, that the thresholds (the cut-points between each successive pair of categories, such as SA, A, D, SD) are ordered correctly. For the PCCS, the categories of SA, A and so on were operating as required, and were thus ordered correctly. For the CSCS, two items were slightly disordered, item 12 indicating that the scaling of categories did not conform to the requirements of the model. For one item, the categories were altered to 0, 1, 2 responses and for the other to 0, 1, 2, 3 responses. Re-analysis then indicated that the categories for all items were operating as required.

Item fit

This assesses whether the items in each scale fit the Rasch model. If so, then the items can be accepted as measuring a single variable at this level of scale, providing evidence of construct validity. In the Rasch paradigm, no one test is sufficient to make a decision about fit. As such, three tests of fit were jointly considered, the log residual and item-trait interaction (statistical tests) and the Item Characteristic Curve (graphical test). The two scales revealed generally good fit to the model. This indicates that both sets of items are internally consistent, with the exception of very few items which were either deleted or, in one particular case, kept because it contained a term that is used in the chiropractic, physiotherapy and osteopathy professions, and discloses a level of confidence in explaining this to patients. However, because different terminology is used in different programs in the future with this particular item all terms should be included in the item statement.

For the CSCS, the least well-fitting was deleted from further analysis. It addressed an overall level of confidence in applying clinical skills, and thus may have been too broad in scope. After re-analysis, only one item showed some misfit but it was retained because it referred to applying orthopaedic bracing or supports on a patient, which is often an important aspect in most chiropractic, physiotherapy, osteopathy and athletic training programs. The reason is not

understood as yet but the item seems an important part of training and thus will be retained for the present and its performance and reason for misfit explored in future studies.

Differential item functioning

This assesses whether any items show differential item functioning (DIF) according to the sub-groups of interest. For the PCCS and CSCS, there was no evidence of DIF in any items according to gender, age, experience or entry qualification. Therefore, the scales measure the same constructs (levels of confidence) for each of the sub-groups, and the measures for each sub-group may be compared.

Targeting

This examines whether the items and persons are targeted to each other (they not too easy or too difficult). Overall, the items are well-targeted to the majority of the participants, which is especially the case for the CSCS. For future use, both scales could have more top end items developed, in order to more reliably measure the highest scoring (most confident) students. For the PCCS, this may include developing items that deal with being more supportive of patient needs and handling non-compliant patients. These two aspects are among the most intense, which means that students need to have a high level of confidence to agree with these. For the CSCS, this may include developing items that focus on performing manipulative skills with challenging patients, which would extend the range of the scale for the highest scoring students. On the CSCS, two items that require a high level of confidence involve working with a wheelchair-bound patient and a pregnant patient.

Item locations

This examines whether the ordering of item locations, according to increasing intensity, was as expected. The lowest locations indicate items that are ‘easiest’ to agree with (least intense), which means that participants with a relatively low level of confidence are likely to agree with these items. Conversely, the highest locations indicate items that are ‘difficult’ to agree with (most intense), which means that participants would need a high level of confidence to agree with these items. Overall, the results were as expected, in terms of the relative level of confidence needed to agree with each item, providing evidence for the validity of the scales.

Item dependencies

This assesses whether particular pairs of items show significant dependency. If so, then one item in the pair is redundant, and retaining both items will artificially increase the reliability. Item dependencies are determined by inspection of the residual correlations between items. For the PCCS and CSCS respectively, 18 pairs and 20 pairs of items showed dependencies. This means that there is a reduction in the number of items because one item in each pair is not adding information about the level of confidence, and rather these pairs are artificially inflating the reliability. For example, analysis revealed that six items in the PCCS deal with specific categories of people (gender, age, disability), and item dependencies indicated that only one item may be required to represent the categories. During the development of a new scale, usually more items than might be required to produce valid and reliable measure are created and included. The future use of these two new scales may involve item reduction.

Reliability

This assesses whether the scales are reliable, using the Person Separation Index (PSI), which is the Rasch equivalent of Cronbach's alpha statistic. For the PCCS and CSCS respectively, the PSIs were 0.962 and 0.930. These are satisfactory, although likely to be inflated due to the item dependencies as mentioned above.

Correlation with existing scales

The correlation coefficients between scores on the two scales and the existing GSE and PRCA-24 (interpersonal communication) scales showed a positive correlation between confidence scores for clinical and patient communication skills and general self-efficacy, and a negative correlation between confidence scores for patient communication and interpersonal communication (lower scores on the sub-category represent less apprehension in communicating). These were the expected findings.

The results showed that the scales, with some amendments, provided valid and reliable measures of confidence for this sample of persons. Analysis revealed very few items showing misfit to the model, and thus the scales are internally consistent with the exception of very few items. Therefore the two scales can provide educators and researches with sound measures of students' confidence in patient communication and clinical skills, which may then be used to identify students who require additional help and also guide curriculum development.

These scales may be used in future research to measure changes in confidence over time and also—in conjunction with objective competence measures—to identify optimal levels of confidence. The Rasch model used for psychometric analysis has not previously been applied in the field of chiropractic and therefore breaks new ground in this discipline.

3.5 Summary of Paper 4:

Hecimovich, M., & Volet, S. (2012). Tracing the evolution of students' confidence in clinical and patient communication skills during a clinical internship: a multi-methods study. *BMC Medical Education, 12*(42).

This empirical paper reports the findings of a mixed methods study of research on the evolution of students' confidence during the clinical internship in a chiropractic programs. It addressed the fifth and sixth aims of this study.

The two newly developed scales (Hecimovich, Styles, & Volet, under review) measured levels of students' confidence in their clinical and patient communication skills at the beginning and end of their clinical internships. The possible relationships of confidence levels and changes in levels over time with gender, age, prior experience within the profession, and qualifications upon entry into the program, were analysed..

Overall students appeared more confident in their patient communication skills (PCCS, M=1.31, SD=1.87) than in their clinical skills (CSCS, M=0.55, SD=1.08) before starting the internship. The correlation coefficient between the scores on the two scales was r=.68

($p<.001$), showing that confidence in patient communication and confidence in clinical skills were inter-related, and may form an overarching construct of professional confidence.

The extent to which the demographic factors were related to initial levels of confidence was examined separately for patient communication and clinical skills. The analysis revealed that there were significant differences in confidence in patient communication between different age, prior experience and prior qualification groups, but not between gender groups. Comparing the three age groups revealed that confidence increased as age increased. Initial levels of confidence for the same demographic factors for clinical skills revealed that prior experience was significantly related to levels of confidence in clinical skills. However, and in contrast to patient communication, there was no relationship with age or prior qualification, suggesting that communication skills may be transferable across situations whereas clinical skills are not.

Paired t-tests also revealed that students' levels of confidence in patient communication (PCCS) skills (Beg, $M=1.21$, $SD=1.77$; End, $M=2.72$, $SD=1.92$; $t(207)$ 13.86; $p<.001$) and clinical skills (CSCS) (Beg, $M=0.06$, $SD=0.99$; End, $M=1.12$, $SD=1.18$, $t(207)$ 15.07; $p<.001$) increased significantly over the duration of the internship.

To determine if change in levels of confidence in patient communication and clinical skills were related to each other, 'difference' scores were computed, for both measures and correlated. The high correlation coefficient between the two change measures, $r=0.72$, $p<.001$ showed that change over time in these two aspects of professional confidence were inter-related.

In order to measure the extent to which change over time was influenced by demographic factors a series of multiple analyses of variance (MANOVA) with repeated measures for time were carried out, with in turn experience, age, gender and qualification as the independent variable. Analysis revealed no interaction effects between any of the independent variables and time as the repeated measure. A number of significant main effects were found for the four independent variables, all of them consistent with the analyses conducted at the start of the internship. In other words, all the demographic factors identified as influencing students' levels of confidence in PCCS and CSCS at the beginning of the internship were found to be significant in students' further development of professional confidence over time.

These interviews sought to elicit reflections on key factors that may be contributing to increasing or decreasing self-confidence, especially in patient communication and clinical skills and to complement the questionnaire data investigating effects of gender and age, experience in the profession, and entry qualifications.

The elicited reflections represented a range of various factors affecting confidence in both patient communication and clinical skills. Some factors affected either confidence in patient communication or clinical skills whilst a few, such as supervising clinicians, influenced both. Four factors were identified affected confidence in clinical skills and seven affecting confidence in patient communication.

For patient communication one factor identified was the importance of the student meeting and greeting the patient in the waiting room, as opposed to the clinician initiating the first contact by bringing the patient to the consultation room. For students, in the early stages of

their clinical internship, this helped them form a better understanding of the patient's condition and consequently boosted their confidence. Another factor identified was the nature of the relationship and interactions between the student and supervising clinician, who guides and directs the learning of the student. In the early stages of the clinical internship, this helped or hindered the initial development of self-confidence, as revealed by this student.

> *I'm not saying this is a good or bad thing on any of the clinicians, but when they don't treat you like equals, sort of give you advice rather than say well you should have been doing this. Sort of go what I would have done, and you know you could have done this and not sort of degrade you*.

As the clinical internship progressed, some students were positively affected by interactions with clinicians, which enhanced their confidence, and they relied less on the clinicians, as revealed by this student: *…to hear that from a clinician made a difference … but coming from a clinician boosts your confidence more*. Other students were negatively affected by interactions with clinicians, which compromised their confidence, as revealed by this student.

> *There are a couple of clinicians which seem a little bit harsher. They're just asking questions as if they're out to get you or something*.

Of importance, the significant impact of the factor continued into the latter stages of the clinical internship.

Other factors identified as influencing confidence in patient communication were non-challenging patients, personal agency, maturing as a clinician, conflicts with patients and student perceptions of the profession. The latter factor was raised and discussed by students with limited increases in confidence as brought forth by this student.

> *I've become more and more confused in the chiropractic paradigm. I don't know if any other profession has such difficulty explaining what they personally do. I mean you go to the dentist, the dentist says, "I do this to your teeth". You go to the chiropractor, what does a chiropractor actually do? So I have trouble summarising it to an answer that wouldn't go something like "are you sure that that has evidence?"*

In terms of student confidence in clinical skills during their clinical internship four factors were identified, including the interactions of students and clinicians, perceived limited clinical skills, personal agency and the audible noise during a manipulative procedure. The latter factor became more central for all students, who equated the sound with success, as revealed by this student: *a lack of experience of achieving a cavitation in that joint … lack of success*. Others recognised the importance of other outcomes, such as the reduction of pain, but the sound remained the key element of success, as revealed by these students: *I like the patient out of pain but I guess hearing the release is probably the most gratifying*; *…if you get an audible*. However, by the end of the clinical internship, only students with limited increases in confidence identified the audible noise as a factor.

The rich data that emerged from this multi-method study may assist clinical educators in manual medicine programs develop means of measuring professional confidence and

fostering its development. One particularly promising area for educational intervention may be the promotion of a pro-active approach to professional learning

3.6 Summary

An overview of each paper constituting the body of this dissertation has been presented. The aims, methodology and the theoretical perspectives utilised in the data analysis were outlined for each of the four papers. Each of the papers is presented in the order they were produced in Appendices. The following section outlines the main findings and discussion and future research project and future research directions.

4 MAIN FINDINGS AND DISCUSSION

4.1 Background to the development of the professional self-confidence scales

This research aimed to investigate the development of professional self-confidence among chiropractic students during their university experience, specifically their clinical internship. The study used a multi method approach, involving two critical reviews of literature, the creation and psychometric analysis of professional self-confidence scales, and an examination of changes in professional self-confidence during clinical internships, focussing on identifying factors that help or hinder its development. In this chapter, the following sections summarise the main observations and findings that emerged from this research.

From the two extensive critical reviews of literature (see Chapter 2 Empirical Study, section 2.2 Methodology) emerged an understanding of the nature and importance of professional self-confidence in health professional education, and the role and impact of guided practice, particularly the clinical internship, on its development. The literature indicated the affect of self-confidence on the performance of two central tasks for most health care professionals, namely communicating with patients and applying clinical skills. While some factors impact on general self-confidence, including personality characteristics or external conditions, other factors notably impact on the professional self-confidence of students, including sensitivity to instruction and guided learning activities. Such educational experiences and opportunities can foster and develop situation-specific self-confidence, such as building rapport and conveying information to patients or performing a range of manual procedures. The literature especially highlighted the role of guided learning activities, which nurture the transition from student to professional. These activities expose students to various focussed practices, such as specific skill instruction, and broad practices, such as the clinical internship. The significant role of the clinical internship and particularly mentors, also known as preceptors or supervisors, on the development of professional self-confidence is widely documented (see Curtis et al., 1998; Goldenberg et al., 1997; Harrell et al., 1993; Lai & Ramesh, 2006; Lai et al., 2007; Levy & Merchang, 2005; Morgan & Cleave-Hogg, 2002; Pitney & Ehlers, 2004; Ryan & Brewer, 1997; Waldeck, Orrego, Plax & Kearney, 1997; Wimmers et al., 2006).

However, despite an overwhelming emphasis on the affect of self-confidence on professional practice and the role of the clinical internship in fostering its development, there is a striking paucity of research on ways to measure the confidence of students during health professional education. The literature on chiropractic education identifies various educational experiences and opportunities that may aid the development of professional self-confidence, including courses and instruments designed to improve psychomotor skills in manipulative procedures, and student internships or preceptorships (Ebbets, 2002a, 2002b; Dunn, 2005, 2006; Scaringe, Chen & Ross, 2002; Triano, Scaringe, Bougie & Rogers, 2006; Young, Hayek & Philipson, 1998). While some research has measured the influence and effectiveness of these initiatives on confidence (Ebbets, 2002a; Dunn, 2006; Spegman & Herrin, 2007), this was not a primary focus. In the manual medicine field, including nursing, some research has addressed the impact of guided learning activities on the development of professional confidence, but this was also limited. Furthermore, in health education, including medicine and nursing, the use of psychometrically valid and reliable scales has been limited, and attempts to identify those factors that are most influential in helping or hindering the

development of professional self-confidence during clinical education programs have been minimal.

Accordingly, in this research, the development of a confidence questionnaire with two new scales, the Patient Communication Confidence Scale (PCCS) and Clinical Skills Confidence Scale (CSCS), measuring the situation-specific self-confidence of chiropractic students during their clinical internships, makes a unique and vital contribution to chiropractic education, the manual medicine field, and health education more broadly. The findings from these critical reviews of literature also provided the impetus for the psychometric analysis of the two new scales to ascertain their validity and reliability, and ultimately to the development of a robust instrument to measure professional self-confidence in chiropractic education programs. The focus on self-confidence in patient communication and clinical skills was based on the reviews of the literature and on my extensive experiences as a practitioner in clinical settings and as an academic in chiropractic education, including numerous casual conversations with students about the issue of self-confidence.

4.2 Analysis of the scales measuring patient communication and clinical skills

There were no identified difficulties with the distribution and collection of the confidence questionnaire.

The data analysis had three aims: 1) to establish whether each of the scales was internally consistent (evidence of validity) and reliable; 2) to check whether each of the scales could be accepted as representing the same construct across different groups of persons (Gender; Age; Experience; Entry qualification); and 3) to examine the correlation between two already well-established scales, both having been established as assessing levels of confidence, and the two newly developed scales to allow further evaluation of the new scales' usefulness in measuring students' levels of confidence

The results pertinent to the first aim showed that the scales, with some amendments, provided valid and reliable measures of confidence for this sample of persons. Analysis revealed the scales are internally consistent with the exception of very few items. High Person Separation Indices, which are the equivalent of Cronbach's alpha statistic, provided statistical evidence of reliability indicating that the scales are able to discriminate amongst persons with different levels of confidence. However, for future use both scales could benefit from more intense items in order to measure the highest-scoring students more reliably. It would be expected during the development of a new scale that more items are developed than might be required to produce valid and reliable measures, and, indeed, future use of these scales may involve item reduction, with the aim of both reducing item dependencies and rendering the questionnaire less time-consuming to complete.

The second aim was to verify whether each of the scales represented the same construct across different groups of persons, a concept known as Differential Item Functioning (DIF). There was no evidence of DIF in either scale according to gender, age, experience, or entry qualification meaning the scales can be accepted as measuring the same constructs for each of these sub-groups and thus measures on each scale may be compared across different groups.

In order to address the third aim, the correlations between two already well-established scales (the General Self-efficacy scale (GSE) and one subscale (Interpersonal conversation) from

the Personal Report of Communication Apprehension scale (PRCA)) and the two newly developed scales were examined. The expectation was that there would be a positive correlation between confidence scores for patient communication and clinical skills and general self-efficacy, and a negative correlation between confidence scores for patient communication and scores on the Interpersonal conversation subscale. The results were consistent with what was expected with correlations indicating some association between the established and the new scales.

In summary then, in health education research, the Rasch model is a valuable approach to use in the rigorous examination and development of instruments. This model facilitates disclosure of measurement problems that may not be easily detected by traditional analysis, such as lack of invariance. The results from the above analysis indicate that the psychometric properties of the PCCS and CSCS are valid and reliable, and thus the scales can be used confidently to measure persons' confidence in patient communication and clinical skills and thereby enable comparison of group and individual levels of confidence and changes over time. The scales can be used in various ways as will be discussed later (see 4.5 Educational contributions).

4.3 Interaction of demographic factors and levels of professional self-confidence

Following the administration of the confidence questionnaire, this research aimed to analyse the gathered data and measure the overall levels of self-confidence in patient communication and clinical skills, and the extent that demographic factors affect these levels. This section discusses these findings, in particular, the initial levels of self-confidence, paying attention to possible interaction effects of gender, age, prior experience in the profession and prior qualifications.

The data revealed that the students appeared more confident in their patient communication skills than their clinical skills at the beginning of their internship. The correlation coefficient between the two scales showed that confidence in patient communication and confidence in clinical skills were interrelated, and may form an overarching construct of professional self-confidence. However, research into the factors that may cause the differing results between these aspects of professional self-confidence has been limited. Previous studies have demonstrated that the clinical internship or preceptorship strengthens student knowledge base and clinical skills (Corlett, Palfreyman, Staines & Marr, 2003; Letizia & Jennrich, 1998; Nehls, Rather & Guyette, 1997), improves critical thinking in practice (Myrick, 1988, 2002), enhances student self-confidence (Fernald et al., 2001; Freiburger, 2002), interpersonal communication (Ellerton, 2003) and role socialization, and reduces conflict in role expectations (Haas et al., 2002). Therefore, given the various effects of this factor, delineating why confidence in patient communication was greater than confidence in clinical skills needs to be further addressed in future research. There have been a few studies that may assist in comprehending this finding. For example, the research by Williams, Dale, Glucksman and Wellesley (1997) on senior house officers' work related stressors, psychological distress and confidence in performing clinical tasks. Their study demonstrated that despite a significant increase in self-confidence among senior house officers' in carrying out a range of activities, self-confidence remained low for certain technical skills (including intubation, plastering, inserting a central venous pressure line). However, while communication difficulties were frequently cited as a stressor (including dealing with demanding, manipulative, violent, or aggressive patients), these did not have as much impact on communication confidence.

In terms of the affect of demographic factors, the data revealed that confidence in patient communication was significantly related to age, prior experience in the profession and prior qualifications, but not to gender. While the relationships with prior experience and prior qualifications were expected, the relationship with age was not expected. A comparison of the three age groups (20-25, 26-35, 36+) showed that confidence in communication increased as age increased. Furthermore, confidence in clinical skills was significantly related to prior experience, but not to age or prior qualification. These findings suggest that communication skills are generic skills that may be acquired through life experiences and are transferable across situations, whereas clinical skills are not. As such, the significant relationship between age or prior qualifications and initial levels of confidence in patient communication may indicate that interpersonal skills are transferable to professional situations, whereas the lack of relationship between these two factors and initial levels of confidence in clinical skills may indicate that technical skills are highly specific to the relevant profession. Of interest, students in the highest age group tended to display lower levels of confidence in clinical skills than those in the mid age range. This may be due to the myriad of issues that mature-age students face in their lives that can erode their general confidence (Bolam & Dodgson, 2003; Hayes, et al, 2004). For example, in the field of health education, Feil, Kristian and Mitchell (1998) reported that older medical students hold a sense of loss of previous personal and professional identity, and Donaldson and Graham (1999) reported that older students frequently disclose that they possess 'rusty study skills', low self-confidence and apprehension upon re-entering college.

The relationship between initial levels of professional self-confidence and prior experience in the profession was expected, and is consistent with Schunk's (1981) claims that exposure to models can instil self-belief, which then influences a person's subsequent course of action. However, students with no prior experience tended to display higher levels of confidence than those with moderate experience. This may indicate over-confidence, which is a concerning phenomenon and is discussed extensively in health professional literature (Freidman et al., 2001). Furthermore, the male students tended to rate their confidence in clinical skills higher than the female students, which is consistent with evidence that females tend to underestimate their abilities (Beyer & Bowden, 1997) and males tend to overestimate their abilities (Blanch et al., 2008). According to Beyer & Bowden (1997), the type of skill or task may influence the level of confidence expressed by females and males. For example, females tend to express equal competence (high confidence) with skills or tasks that are perceived as gender-neutral or traditionally 'feminine-type' (particularly verbal or interpersonal), and underestimate their competence with skills or tasks that are perceived as traditionally 'masculine-type'. This was reported in research with medical students, where female students underestimated their surgical skills, possibly due to the perceived notion of surgeon as a traditionally 'masculine-type' occupation (Baxter, Cohen & McLeod, 1996; Lind, Rekkas, Bui, Lam & Beierle, 2002; Minter et al., 2005). A similar perception may underlie the findings in this research. Some of the clinical skills used in manual medicine, such as joint mobilisation/manipulation, may be perceived as more physical, and thus traditionally 'masculine-type'.

The relationship between levels of professional self-confidence and the various demographic factors must be carefully considered by educators, supervisors and mentors involved in health professional education programs. The demographic factors, particularly gender, age, prior experience in the profession and prior qualifications, seemingly play a significant role in the

development of professional self-confidence of students during their clinical internship or preceptorship, and implementing means to measure and monitor their confidence is of paramount importance.

4.4 Professional self-confidence during the clinical internship, and influential factors

As discussed, this research primarily aimed to develop a psychometrically robust instrument to measure changes in levels of professional self-confidence. A confidence questionnaire was therefore created, comprising two new scales measuring the patient communication and clinical skills (situation-specific self-confidence) of chiropractic students during their clinical internship. The scales were administered twice during the clinical internship, which provided valuable data on the changes in confidence over time. Furthermore, this research primarily aimed to develop a greater understanding of factors that influence student professional self-confidence during the clinical internship. A series of semi-structured interviews with students were therefore conducted during their clinical internship. The interview results provided rich data on the development of professional self-confidence, complementing the questionnaire data. This section will explicate the results and main findings from the questionnaire and student interviews.

Questionnaire data

An examination of the questionnaire data using paired t-tests revealed that levels of self-confidence in patient communication and in clinical skills increased significantly during the clinical internship. To determine whether these changes were related to each other, 'difference' scores were calculated and correlated, for both measures. The high correlation coefficient between these showed that the changes in levels over time were interrelated. Previous research, in medical, dental and nursing education fields, has described increases in levels of self-confidence in skills, reported by students, following their clinical internships or preceptorships (Goldenberg et al., 1997; Lai et al., 2007). Accordingly, this research makes a rare contribution, in its endeavour to systematically measure changes in levels of self-confidence during a clinical internship in the field of chiropractic education. Of importance, the scales contained items that addressed specific patient communication and clinical skills required in profession practice. In manual medicine fields, such as chiropractic, a range of particular skills are routinely used, spanning from basic exam procedures to manipulative techniques.

In addition, the extent that demographic factors affected these changes in professional self-confidence was measured using a series of multiple analyses of variance (MANOVA), with gender, age, prior experience in the profession and prior qualifications as the independent variables, and with repeated measures for time. The results revealed no interaction effects between any of the independent variables and time. However, consistent with the analyses conducted earlier, the four demographic factors have some influence on initial levels of self-confidence in patient communication and clinical skills, at the beginning clinical internships or preceptorships, and the further development of professional self-confidence over time.

While the results revealed overall increases in levels of professional self-confidence, there were large individual differences in the degree of increase. For some students only a limited increase in professional self-confidence was observed, while for other students a dramatic

increase was observed. Only focussing on the overall increase in self-confidence overlooks significant individual differences. It is important to understand these differences because it is the individual students, not the cohort, who eventually becomes the lone practitioner, and it is vital to develop an awareness of factors that help or hinder the development of their self-confidence during the clinical internship. These factors were identified and explored in semi-structures student interviews.

Interview data

During the interviews, student's specified an extensive range of factors as influencing their professional self-confidence during their internship. Some of these factors were perceived as affecting self-confidence in both patient communication and clinical skills. For example, interaction with clinicians and personal agency, which are related to other factors, such as maturing as a clinician, perceived limited clinical skills and conflicts with patients. Other factors were perceived as affecting either patient communication or clinical skills. For example, perceptions of the profession impacted on confidence in patient communication, and the audible noise released during a manipulative procedure impacted on confidence in clinical skills. The various factors influencing the development of professional self-confidence are discussed further below.

Confidence in patient communication

In terms of student confidence in patient communication during their clinical internship, various factors were revealed as influential. While the confidence of some students rose significantly and they became more proactive and matured as clinicians, other students clashed and struggled with clinicians and patients, and with the identity of the profession. Overall, seven factors were identified.

The first factor identified was the importance of the student meeting and greeting the patient in the waiting room, as opposed to the clinician initiating the first contact by bringing the patient to the consultation room. For students, in the early stages of their clinical internship, this helped them form a better understanding of the patient's condition and consequently boosted their confidence. This factor has been established in the literature, which reveals that first impressions often turn into long-term perceptions and reputations. Within the first few seconds of meeting a new person, an opinion is formed based on the appearance, mannerisms and body language. These opinions can be difficult to overcome or undo, making the first encounter extremely significant. As such, the first meeting of a clinician and patient is the most important one. In those first few minutes, the patient will decide whether he/she can feel comfortable sharing information with the clinician (Mauksch, Dugdale, Dodson & Epstein, 2008; Nelson, 2008). However, previous research has overlooked the significant impact of this factor on the confidence for both clinicians and students.

The second factor identified was the nature of the relationship and interactions between the student and supervising clinician, who guides and directs the learning of the student. In the early stages of the clinical internship, this helped or hindered the initial development of self-confidence. As the clinical internship progressed, some students were positively affected by interactions with clinicians, which enhanced their confidence, and they relied less on the clinicians. Other students were negatively affected by interactions with clinicians, which compromised their confidence, as revealed by this student. Of importance, the significant impact of the factor continued into the latter stages of the clinical internship.

The third factor identified, especially by students with a limited increase in confidence, was having a non-challenging patient. This boosted the confidence of students, in the early stages of the clinical internship. As the clinical internship progressed, this factor continued to impact student confidence, and difficult cases were a concern. Unfortunately, there is limited research addressing this particular factor; however, one study investigating nurses reported that they found it difficult to communicate with patients who presented with serious to life-threatening medical conditions (Sheldon, Barrett & Ellington, 2006). Although the medical conditions in this research are much less serious, the findings are comparable.

The next three factors identified were personal agency, maturing as a clinician and conflicts with patients. These factors are broadly linked, whereby students with higher levels of confidence are more likely to develop personal agency, mature as a clinician and have less conflicts with patients, and conversely students with lower levels of confidence are less likely to develop personal agency, mature as a clinician and have more conflicts with patients. For example, at different stages in the clinical internship, students who had significant increases in confidence demonstrated personal agency and maturity by displaying proactive ways of improving their communication skills. Students who had significant increases in confidence, also perceived patient interaction and action as important, and displayed an ability to build rapport with patients, as revealed by these students.

In contrast, students who had limited increases in confidence expressed personality conflicts with patients, notably during the latter stages of their internship whilst some students also projected blame onto the patient.

Previous research supports the link between these three factors, personal agency, maturing as a clinician and conflicts with patients. For example, self-efficacy enables students to feel more confident and less anxious, and engage in self-regulation of learning (Butler & Winne, 1995). The findings in this research reflect Bandura's (2001a) view on human agency as the essence of humanness, reflecting a person's capacity to exercise some control over the nature and quality of his or her own life.

> Human agency is characterized by a number of core features. These include intentionality for shaping future plans and courses of action, temporal extension of agency through forethought, self-regulation of motivation, affect, and action through self-influence, and self-reflectiveness concerning one's functioning and the meaning and purpose of one's life. These core features of self-directedness enable humans to play a part in their own development, adaptation, and self-renewal (Bandura, 2001a, p. 12).

Accordingly, students with increased levels of confidence possess these core features. In this research, these students were able to self-reflect and visualize their future, through proactive ways of improving, and thus shape their overall view on the future, which transpired to better relationships with their patients.

In addition, there is a relationship between learning, performance and motivation, whereby the learning of students depends on their prior knowledge, and their motives, intention and motivation for studying (Biggs, 2003). Motivation is a process that requires a level of physical or mental activity, which directs students toward attaining their goals (Schunk, Pintrich & Meece, 2008). In previous research, the motivation of students can be divided into

extrinsic and intrinsic forms, which are interactive. Extrinsic approaches to education can be summed up as coming from outside of the student, such as earning a degree or money, the recognition and approval of others, like parents (Biggs, 2003; McKeachie, 2002), and the avoidance of negative reinforcement (Biggs, 2003). Students who are extrinsically motivated work on tasks because they believe that participation will result in some kind of external reward. Intrinsic approaches to education come from the students themselves, such as the motivation to work on a task for its own sake (Schunk et al., 2008), and achieving satisfaction or the feeling of accomplishment. Students who are intrinsically motivated learn for pleasure, and have self-determination about their educational path. Students who are well-motivated choose tasks that enhance their learning, and work hard at them (McKeachie, 2002).

The final factor identified were student perceptions of the profession, which were especially raised and discussed by students with limited increases in confidence in the latter stages of the clinical internship. This seemed to impact the capabilities of students, as revealed by these students. These reflections on the chiropractic profession highlight the broader issue of how students perceive their chosen profession. Notably, only students with limited increases in confidence addressed this issue, and a myriad of reasons may explain such perceptions. However, recent research with non-practicing chiropractors has pointed to chiropractic dogma and philosophy as reasons to abandon active practice (Mirtz, Hebert & Wyatt, 2010). This study revealed that such perceptions evolve as early as during professional education. In addition, as reported by nursing students, there may be confusion between what students learned in their education and what was expected of them in practice (Sharif & Masoumi, 2005). Nonetheless, these perceptions, feelings and effects may ultimately contribute to students leaving the program and profession.

Confidence in clinical skills

In terms of student confidence in clinical skills during their clinical internship, a broad range of clinical skills were explored, including physical examination and manipulative procedures. Overall, four factors were identified, including the interactions of students and clinicians, perceived limited clinical skills, personal agency and the audible noise during a manipulative procedure.

The first factor identified, similar to patient communication, were encounters and interactions with supervising clinicians, which was a significant factor for all students, those with limited increases and significant increases in confidence. In the early stages of the clinical internship, clinician feedback was reported as a key aspect impacting on the development of confidence in clinical skills, as revealed by this student. As the clinical internship progressed, clinician feedback continued to be a key aspect, but by the end of the clinical internship personality issues were being raised.

The next two factors identified were perceived limited skills and the development of personal agency, which are broadly linked. For example, students with limited increases in confidence perceived their limited manipulative skills as a hindrance, which resulted in self-doubt and inhibited further action and seeking ways to improve. In contrast, students with significant increases in confidence in manipulative skills became more proactive in latter stages of the clinical internship. These students displayed personal agency by embodying a mature approach to perceived failure and seeking ways to improve their skills.

During the clinical internship, students with significant increases in confidence appeared more mature as student-clinicians and eventually relied less on the supervising clinicians, while students with limited increases in confidence had not yet matured as student-clinicians and continued to have mixed interactions with the supervising clinicians. They continuously relied on clinicians, perceived their clinical skills as limited, and struggled with challenging patient conditions and patient conflicts. Some admitted relying on clinicians too much, while others still perceived them as being harsh in their approach. This is consistent with Bandura's (1999) claim that self-efficacy is the foundation of human agency, in that, unless people believe they can produce desired effects by their actions, they have little incentive to act. This may explain why some students, in this research, had little incentive to seek ways to improve. However, more research is needed to fully understand this phenomenon.

Previous research supports these findings, regarding the role and impact of self-confidence on perceived limited skills and the development of personal agency. As reported, self-confidence in one's skills is a powerful reinforcement for any activity (Wechsler et al., 1983). As such, students with higher levels of confidence sought ways to improve as clinicians and also build rapport with patients, while students with lower levels of confidence did not display personal agency and also reported having patient conflicts. According to Davis and Bove (2008), at the core of the healing process is the complex interaction between clinician and patient, and vital to productive interaction is the clinician's professional self-confidence. They claim that the interaction between clinician and patient can have a pronounced impact on patient health and recovery, as it offers opportunities for the clinician to respond to the biopsychosocial needs of the patient. In other words, the clinician needs to connect with the patient physically and psychologically, since this facilitates the healing process. This may reveal why students with higher levels of confidence did not report patient conflicts, because they established a strong positive interaction.

The final factor identified was the audible noise released during a manipulative procedure (popping or cracking), which students use to measure success in the clinical skill. In the early stages of the clinical internship, only those students with significant increases in confidence discussed this. However, as the clinical internship progressed, this factor became more central for all students, who equated the sound with success. Others recognised the importance of other outcomes, such as the reduction of pain, but the sound remained the key element of success. However, by the end of the clinical internship, only students with limited increases in confidence identified the audible noise as a factor.

The importance of this factor was not surprising, as the placebo effect of the audible can be important and beneficial for both the student and the patient. It is not unreasonable to assume that the patient expects to hear a cracking sound during treatment and interprets this sound as a sign of a successful adjustment (Cleland, Flynn, Childs & Eberhart, 2007; Flynn, Childs & Fritz, 2006). Also, as indicated in this research, at some stage students focus primarily on the audible noise and not patient outcomes as a measure of success. However, even if students focused on patient outcomes, such as pain, range of motion and activities of daily living, and minimised their belief in the audible, they would still need to contend with the effect it has on the patient. Therefore, students would need to communicate to their patients that the audible does not necessarily equate with success, and if their confidence in patient communication is limited this may not be successfully addressed.

The rich and extensive data garnered from the questionnaire and student interviews, revealing changes in the professional self-confidence of students during their clinical internship and the influence of various factors, provides evidence on the importance of further research in this area. While some aspects and factors have been established in the literature, other aspects and factors need to be more comprehensively examined. Nonetheless, the data and main findings in this research make a unique contribution to chiropractic education and health professional education, as discussed in the following section.

4.5 Contributions to professional health education

The multi method approach used in this research, including critical reviews of literature, the development of scales measuring professional self-confidence, and examining data from the questionnaire and student interviews, has especially enabled an understanding of changes in levels of professional self-confidence, and the identification of factors that help or hinder this. Insights into the significant clinical experiences of students, revealing the various factors that limit or increase levels of self-confidence in patient communication and clinical skills across groups of students and stages of the clinical internship, were particularly valuable. Overall, this research and inherent methodology imbues considerable potential, in terms of providing a comprehensive understanding of the complexity of self-confidence as it relates to the clinical experience.

From the perspective of health professional education, evidence pertaining to the nature and development of self-confidence, and its importance for students has important consequences. This has the potential to generate discussion among health professional educators, curriculum and program developers, clinical supervisors and mentors, leading to changes in the design and implementation of clinical internships towards enhancing the experience for students. A range of areas relevant to educational practice are discussed below.

Use of scales in manual medicine fields

In this research, the rigorous development and psychometric analysis of two new scales (the PCCS and CSCS), measuring the situation-specific self-confidence of chiropractic students during their clinical internship, makes a unique and vital contribution to health professional education. These scales can be used independently to monitor student self-confidence, which will enable educators, clinical supervisors and mentors to determine and assist students who have lower levels of self-confidence. In addition, these scales can be used in combination with clinical competency exams, such as the Objective Structured Clinical Examination (OSCE), in order to measure the relationship between self-confidence and competency, and elucidate whether levels if competence similarly increase. This will provide evidence of optimal levels of self-confidence for students.

The two new scales are specific to chiropractic education, and the items were formulated to simulate the clinical environment that students and practitioners are exposed to. Pre-clinical curricula and programs, and standards and guidelines for practice establish the context in which students are trained and practitioners perform. Therefore, real interactions, issues and skills common in the chiropractic field were referred to in particular items, such as physical examination procedures, musculoskeletal assessment and manipulative procedures. However, as previously mentioned, the two new scales may be used in other manual medicine fields,

such as osteopathy, physiotherapy and athletic training. These fields are similar and share certain curricula and practices, thereby allowing the scales to be utilised in their clinical education programs. As explained by the Australian Osteopathic Association (2012):

> … [osteopathy] focuses on how the skeleton, joints, muscles, nerves, circulation, connective tissue and internal organs function as a holistic unit. Using skilled evaluation, diagnosis and a wide range of hands-on techniques, osteopaths can identify important types of dysfunction in the body. Osteopathic treatment uses techniques such as stretching and massage for general treatment of the soft tissues (muscles, tendons and ligaments) along with mobilisation of specific joints and soft tissues.

In Australia, like chiropractors, osteopaths are government registered practitioners who must complete a minimum of five years of university training in anatomy, physiology, pathology, general medical diagnosis and osteopathic techniques. Osteopaths are primary healthcare practitioners and are trained to recognise conditions that require medical referral. They are also trained to perform standard medical examinations of the musculoskeletal, cardiovascular, respiratory and nervous systems (Australian Osteopathic Association, 2012). Due to the commonalities between the chiropractic and osteopathic fields (most notably in Australia and the United Kingdom), which obtain in-depth patient histories and apply skills, such as musculoskeletal assessments and manual therapies, the two new scales can be applied in its clinical educational programs.

In the United States, the doctorate of physical therapy (physiotherapy) includes a range of content and areas, such as neuroscience, communication, cardiovascular and pulmonary, and musculoskeletal, and on average students spend 27.5 weeks in clinical internships (American Physical Therapy Association, 2012). In Australia, the Australian Physiotherapy Association (2012) states:

> …most physiotherapy courses will have both a theoretical and practical component. The theory will usually come in the form of lectures, tutorials or directed learning, which provide much of the required information. Practical classes allow students to practise methods for themselves or see applications of the theory in a real world situation. Students will undertake placements at different health care centres, including acute hospitals, private practice, community health centres or rehabilitation hospitals.

In practice, physiotherapists assess and diagnose patient's conditions, develop treatment plans and apply various treatments, such as exercise programs, massage, joint manipulation and mobilisation, hot and cold packs, electrotherapy, a range of aids (splints, crutches, canes and wheelchairs).

Athletic training education programs use a competency-based approach in both classroom and clinical settings. Using a medical-based education model, athletic training students are taught to provide comprehensive preventive services and clinical care, such as patient evaluation and diagnosis, treatment (such as massage, joint mobilisation, hot and cold packs, electrotherapy) and rehabilitation. The educational requirements include comprehensive psychomotor (skills) content and clinical learning opportunities. Students receive formal instruction in orthopaedic clinical examination and diagnosis, medical conditions and

disabilities, therapeutic modalities and rehabilitation conditioning. Students must undertake a minimum of two years of clinical education and gain extensive experiences associated with different patient populations, based on gender, varying levels of risk, and general medical conditions (such as diabetes, asthma). These clinical experiences enable students to practice and learn under the direct supervision of qualified clinical instructors (National Athletic Trainers' Association, 2012).

Benefits for educators, supervisors and students

For health professional educators, clinical supervisors and mentors, or those involved in the development and coordination of clinical internships or preceptorships, the relevant findings in this research provide insights into the factors that help or hinder the development of self-confidence for students. This research shows increases in levels of self-confidence for all students during the clinical internship; however, demographic factors may influence this, namely gender, age, prior experience in the profession and prior qualifications. For example, mature-aged students may possess additional prior experience and qualifications, and may excel in transferable skills, such as communication, but may require some help for newly introduced clinical skills. An awareness of this is imperative for educators and supervisors, especially if they place mature-aged students in a mentoring role.

Further relevant findings, stemming from the student interviews, included the relationship and interactions between students and supervising clinicians, which was commonly identified by students as a significant factor influencing their self-confidence in patient communication and clinical skills. Clinical supervisors monitor, guide and provide feedback to students on matters of personal, professional and educational development in the context of patient health care (Kilminister, Jolly & van der Vleuten, 2002), and it has been suggested that this relationship, as an educational alliance, mirrors the therapeutic alliance between patient and physician (Tiberius, Sinai & Flak, 2002). Clinical supervisors need to be aware of their significant role and influence. They can play an important part in identifying students who may have lower levels of self-confidence, by recognising the key attributes or behaviour patterns that indicate this. For example, students who lack motivation or personal agency, who fail to thrive or further develop their patient communication and clinical skills, or who report conflicts with patients and blame them for poor care outcomes. They can also identify those students who demonstrate frustration with the identity and certain aspects of the profession, which may cause students to struggle and question their practice and intended professional field. These frustrations coupled with lower levels of self-confidence may cause some students to leave the program. Students with these experiences need to be identified and mentored, in order to ensure these attributes or behaviours are curtailed and modified.

Another interesting factor, stemming from the student interviews, was the propensity for students to rely on the audible noise released during a manipulative procedure (popping or cracking), to measure the success of the procedure and thus the clinical skill. This sound may indicate a successful procedure, but students also need to consider objective outcomes when assessing the success, such as pain and range of motion. It is important for educators, clinical supervisors and mentors to be aware of this propensity, in order to further instil evidence-based practice in educational programs as well as professional practice. Although this factor may be specific to the chiropractic field, which relies heavily on manipulative procedures as its primary therapeutic intervention, other fields that incorporate this in their curricula also need to be aware of this aspect for the student and patient. Overall, the findings from this research highlight the complexity of professional self-confidence, in terms of its nature and

development for students during their clinical internship. Health professional educators, clinical supervisors and mentors need to be aware of the various and pervasive factors that may evolve and underlie lower and higher levels of self-confidence experienced by students.

4.6 Limitations and directions for future research

This dissertation has addressed the construct of confidence, and investigated the nature and development of professional self-confidence among chiropractic students during their clinical internship. In assessing self-confidence across patient communication and clinical skills, the research combined qualitative and quantitative methodologies, which provided constructive information for educators, supervisors and mentors within professional education programs. While this research has primarily focussed on chiropractic students, the process and findings are also relevant and partly generalisable to other health professional education programs, including those that are closely related (athletic training), similar (osteopathy and physical therapy), or share some commonalties (medicine, nursing and dentistry). Nevertheless, this research also comprises a number of limitations that warrant attention.

First, focussing on and measuring students in the chiropractic field may not wholly represent the range of manual medicine programs, also including osteopathy, physiotherapy and athletic training fields. For example, osteopathy curricula can vary extensively, from programs based on United States models that mirror medicine, to programs in Australia that focus on manual therapies. Physiotherapy curricula especially emphasises pre- and post-surgical rehabilitation, and neuro-rehabilitation, such as post-stroke and post-spinal cord injury. Athletic training specifically addresses on-field emergency procedures and pre-event functions, such as taping, stretching athletes and monitoring warm-ups. These noted differences in curricula, and thus professions, highlight the need to carefully consider the items in the two new scales.

Second, the contextual scope of the qualitative (interview) data was limited to two separate student cohorts from a single university chiropractic program. These factors, as well as the recurrent adaptation of curricula, make it difficult to generalise the findings to other contexts and student experiences. Due to the small sample size, the research could not reliably relate interview findings and demographic factors, and identify tendencies. Yet, such connections may exist and could be examined in future research. Also the research did not compare the impact of different clinical opportunities, such as the on-campus internship and the external placement. In the United States, it is common for chiropractic students to intern with a field practitioner in the final stages before graduation graduate. This would be a prime context for future research.

Finally, analysis of the relationship between confidence and competence was not undertaken in this research. These constructs are intrinsically related, and arguably this relationship needs to be better understood, in order to recognise self-confidence as a vital construct requiring thorough investigation in health education. According to Bandura (1977, 1997), the most effective way to acquire and enhance self-efficacy (closely associated with self-confidence) is through mastering skills. A person gains self-efficacy through repeated successes, and loses self-efficacy through repeated failures, especially when the failures occur early in the course of attempts or performances, and do not reflect a lack of effort or adverse external conditions. However, once a strong sense of self-efficacy is built, occasional failures are unlikely to have

much effect on a person's judgement of or belief in their abilities, and they are more likely to identify situational factors, insufficient effort or poor strategies as causing poor performance. When they ascribe failure to faulty strategies rather than their inabilities, failure can enhance confidence and initiate the development of better strategies to bring future successes. In turn, once established, self-efficacy tends to generalise to other situations where performance has been self-debilitated by preoccupation with personal inadequacies (Bandura, 1977, 1997).

Furthermore, this research highlights a number of directions for future research. While the research has exemplified an approach to examine the professional self-confidence of students in clinical internships in manual medicine, it should be understood as exploratory in nature. Further research is needed to thoroughly investigate the nature, importance and development of professional self-confidence in various manual medicine education programs and through different guided practice opportunities, including clinical internships or preceptorships. A range of relevant issues and initiatives for future research emerged from the findings, and are discussed below.

First, the relationship between professional self-confidence and competence within manual medicine education programs and contexts needs to be explored. Self-confidence is a vital element in the professional development of students, and this must be supported by a similar level of competence (Ytterberg et al., 1998). Competence refers to the mastery of a relevant body of knowledge and a range of skills, including clinical, interpersonal and technical skills and is a prerequisite to performance in clinical settings (Newble et al., 1994). A lack of self-confidence in professional abilities may engender stress and prevent optimal performance, whereas misguided over-confidence in professional abilities may endanger patients, and lead to malpractice or other serious professional consequences. While this relationship has been examined in medicine, in relation to medical diagnosis (or cognitive ability) (Friedman et al., 2005), obstetrics and gynaecology (Elzubeir & Rizk, 2001), managing patient problems (Morgan & Cleave-Hogg, 2002), and evidence based medicine (Lai & Teng, 2011), this has not as yet been investigated in manual medicine. The findings in this research revealed an increase in professional self-confidence for all students during their clinical internship, but whether levels of competence similarly increased needs to be further explored. Even though the skills of students may have reached a ceiling once they begin their clinical internship, and measuring changes during this period may not reveal significant changes, instruments should be used to elucidate the relationship, including the two new scales and clinical competency exams, such as the OSCE.

Second, the self-confidence of educators, supervisors or mentors involved in the professional development and clinical education of students needs be analysed. Previous research has uncovered some evidence of a link between the self-confidence of supervising clinicians and the achievement of students (Goldenberg et al., 1997). Examining this further is warranted due to the strong influence of educators, supervisors or mentors on the students during this period. However, the methodological approach used needs to be carefully considered. When measuring self-confidence, levels need to be compared to a standard, which has not as yet been established for educators, supervisors or mentors. However, using qualitative methods (interviews) may provide some initial insight, and help identify key factors and elements .

Third, the various clinical internship or preceptorship opportunities available for chiropractic, osteopathy, physiotherapy and athletic training students need to be compared. These programs comprise a range of clinical experiences and placements, and comparing how they

affect self-confidence may provide educators with specific aspects that might be implemented across all opportunities, where possible. The chiropractic students in this research reflected on how an outreach placement was superior in building their professional self-confidence, due to higher patient loads, less restrictive clinicians and different office protocol. In addition, previous research in medicine and dental education examined the affect of rural placements on student satisfaction. The results indicated that they may be more beneficial for the development of professional self-confidence than traditional hospital or university-based placements, due to more approachable clinicians, and greater opportunities for patient encounters, hands-on care and exposure to diverse conditions, which ultimately leads to more practical experience (Kamien, 1996; Lyon et al., 2008; Parry et al., 2002; Smith et al., 2006).

Fourth, the perceptions of patients about the professional self-confidence of student interns they encounter, in terms of communicating and applying clinical skills, need to be examined. The feedback provided may assist students, and augment their professional development and practice. Previous research has indicated that the doctor-patient communication is a major component of health care provision (Suarez-Almazor, 2004), and an effective doctor-patient relationship can reinforce the patient's self-confidence and motivation, and inspire a positive view of their health status, which may influence their health outcomes (Kaplan, Greenfield & Ware, 1989; Skea et al., 2004). During interviews in this research some students reflected that self-confidence is also an external presentation, whereby acting and talking confident may benefit the patient. Such students may welcome feedback that helps them self-assess how they present to patients.

Finally, the use of various teaching models or technologies and the effect on self-confidence needs to be investigated. The traditional internship model for teaching clinical skills is no longer feasible due to the shortage of faculty (Kohn, Corrigan & Donaldson, 2000). However, this educational model may be augmented with simulation training, centralised skills training centres and Web/Medicine 2.0 applications (Blum, Borglund & Parcells, 2010; Boulos, Maramba & Wheeler, 2006), which support a constructivist approach to learning (Jonassen, Peck & Wilson, 1999). Enhanced medical trainee education, incorporating new and emerging technologies for teaching and learning, may increase team communication and collaboration, skill engagement and performance, and competency. This may contribute to the building of professional self-confidence. The introduction of mobile audiovisual technologies in clinical internships or preceptorships is ideal, due to their convenience and the specific educational content they deliver. As students are accustomed to technologies, implementing and analysing them in a research project has merit.

Overall, manual medicine programs and guided practice opportunities, including clinical internships or preceptorships, impact on the development of professional self-confidence for students. However, more analysis is warranted to determine the factors and components that influence, cultivate and augment this. Further research incorporating the issues and initiatives discussed here would be a valuable starting point for a more comprehensive understanding and explication of the nature, development and significance of professional self-confidence within health education and clinical contexts.

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APPENDIX A
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APPENDIX B
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APPENDIX C
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APPENDIX D
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APPENDIX E
(Insert Questionnaire)